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IBM to patch holes in its 6611 router

By Michael Cooney
Senior Editor

RALEIGH, N.C. — In an effort to plug the gaps in its router armor, IBM in coming months will add features that will enable its 6611 to support more intelligent SNA devices as well as Ethernet and X.25 connections in SNA nets.

IBM will give the 6611 support for PU Type 2.1 devices that need to link to a mainframe over Synchronous Data Link Control lines, thus improving its ability to handle machines such as the Application System/400 minicomputer. Additionally, Big Blue will enhance the router's support for Ethernet and upgrade its X.25 features with new host access options and additional multiprotocol support.

Most of the new features will be added to the Data Link Switching (DLSw) software found in the router's Multiprotocol Network Program operating system. DLSw is IBM's technology for routing Systems Network Architecture and Network Basic I/O System traffic over Transmission Control

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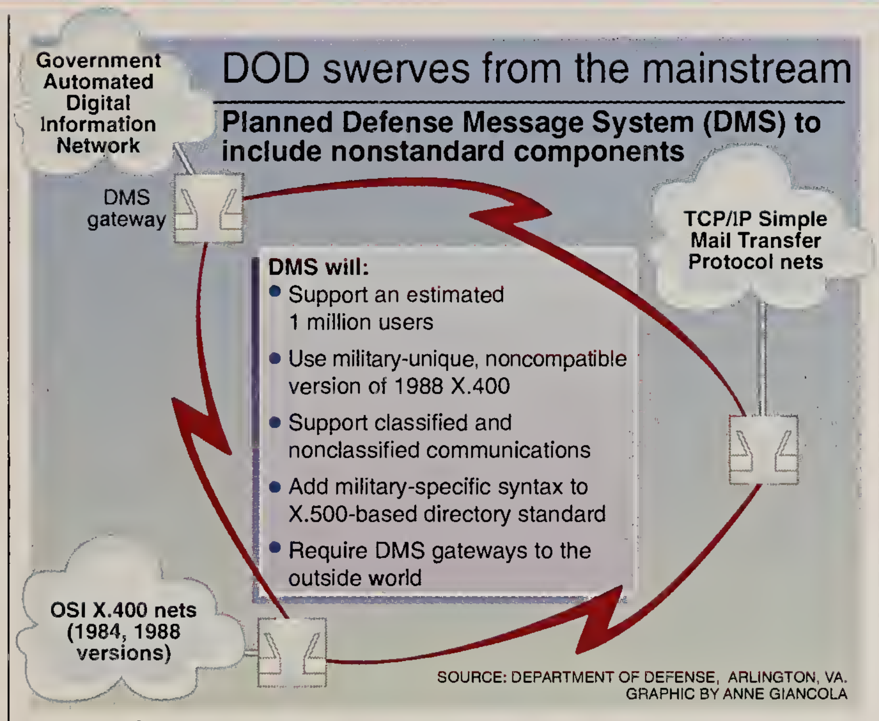
Government Automated Digital Information Network
DMS gateway
TCP/IP Simple Mail Transfer Protocol nets
OSI X.400 nets (1984, 1988 versions)

DOD swerves from the mainstream

Planned Defense Message System (DMS) to include nonstandard components

DMS will:
- Support an estimated 1 million users
- Use military-unique, noncompatible version of 1988 X.400
- Support classified and nonclassified communications
- Add military-specific syntax to X.500-based directory standard
- Require DMS gateways to the outside world

SOURCE: DEPARTMENT OF DEFENSE, ARLINGTON, VA.
GRAPHIC BY ANNE GIANCOLA

Defense Dept. goes against grain with proprietary net

By Ellen Messmer
Senior Correspondent

WASHINGTON, D.C. — The Department of Defense will release a request for proposal early next year for a military message network that will be based in part on nonstandard components and require a complex series of gateways to communicate with the outside world.

Although the Defense Department's arguments for departing from Open Systems Interconnection standards for the one million-user Defense Message System (DMS) are compelling, use of a military-unique version of the 1988 X.400 standard will force the agency to buy what amounts to a proprietary system.

Even the X.500 directory services to be used in DMS will differ from standard implementations because the agency will add defense-specific syntax.

DMS is intended to replace the 20-year-old Automated Digital Information Network (AUTO-

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Road to open nets is paved with objects

Users see distributed object computing as last, best hope for fulfilling promise of open systems.

By Wayne Eckerson
Senior Editor

BOSTON — With the 97th running of the Boston Marathon as a backdrop, several hundred users gathered here last week to begin a long journey of their own down the road to distributed object computing (DOC).

Users attending the Patricia Seybold Marathon Week conference here spent five days exploring the benefits and challenges of deploying object-oriented technology to build the next generation of network-based applications.

Speakers from companies such as Brooklyn Union Gas Co., Citibank, N.A. and Unum Corp. described how they are deploying DOC to solve fundamental problems, including how to integrate legacy systems within a distributed computing environment or rearchitect existing systems to support reengineered business processes.

"[DOC] makes an incredible amount of sense at an intuitive level, and it has already paid off for some leading-edge companies that have built systems this way," said John Rymer, vice president at the Patricia Seybold Group here and conference co-

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NETLINE

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NSA READIES CAPSTONE public-key encryption chipset. Page 5.

UB, NETWORTH INTRODUCE first segmentable device in stackable hub mart. Page 5.

APPLE, NOVELL work to put Mac on PC for bigger slice of OS market. Page 6.

TEXAS INSTRUMENTS to bundle PeerLogic's middleware with its CASE tool. Page 6.

NOVELL PUSHES FORWARD on application development front with purchase of STI. Page 6.

NETLINK ROLLOUT delivers SNMP to SNA platform. Page 6.

DEC HARVESTS Alpha Farms workstation clusters. Page 6.

NEWSPAPER
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Microsoft's OLE challenged by rivals and Unix camp

By Wayne Eckerson
Senior Editor

PARSIPPANY, N.J. — Unix International, Inc. (UI) last week moved to preempt Microsoft Corp. and other big vendors from controlling the technology that will link objects across applications in a distributed environment.

The vendor consortium based here issued a request for proposal for Application Linking technology that enables Unix applications to link, transfer and share objects, such as spreadsheet data and text documents, across a network.

The RFP is a response to members of the Unix community who have expressed great interest in deploying Object Linking and Embedding (OLE) technology on Unix platforms. "There is pent-up demand for this linking technology," said Mark Doran, technical project manager at UI here.

But the move is also an attempt to beat a growing list of industry players from defining de facto standards for integrating compound applications across a network.

Microsoft has already deployed OLE technology for Windows and Apple Computer, Inc. Macintosh applications on standalone machines. However, it is working on extending OLE technology in a new distributed object-based operating system,

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PowerSoft powers up PowerBuilder

By Bob Brown
Senior Editor

SAN DIEGO — Powersoft Corp. last week took the wraps off PowerBuilder 3.0, a new version of its client/server development tool that makes it easier for teams of programmers to build enterprise-class distributed applications.

Powersoft also announced a development tool for "power users," dubbed PowerMaker, and a data access product for the rank and file, called PowerViewer.

The products, unwrapped at the firm's annual user conference here, received a ringing endorsement from most of the 1,000 users and independent software developers in attendance. However, attendees took Powersoft to task for not making beta copies more widely available.

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Are You Ready?

Your company is facing a flood of data. And your people are demanding bigger, faster and more diverse services. Like E-mail, videoconferencing, LAN interconnection and high-speed data transmission. This means your network is growing in size and complexity. That's why you should call on your local phone company. Your phone company is backed by the products and services of AT&T and AT&T Bell Laboratories. That makes it easier for them to give you the quality and reliability you need. So it'll be easier for you to get your service up. To get all your people hooked up. And to keep your network up. Plus, your phone company can provide all the bandwidth you demand, on demand. So call your local phone company. And see how easy it is to handle your data when you're wired into the right people.

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broadband needs are becoming much
more than a drop in the bucket.

UB, NetWorth to introduce segmented stackable hubs

Companies team to develop basic platform and add features geared to their respective users.

By Skip MacAskill
Senior Writer

SANTA CLARA, Calif. — Ungermann-Bass, Inc. and NetWorth, Inc. this week will enter the stackable hub market with the introduction of the industry's first segmentation device.

The 10Base-T hub, jointly developed by the companies, supports three 10M bit/sec Ethernet backplanes and 24 RJ-45 ports, and can be segmented to support three independent eight-port local-area networks. One of the RJ-45 ports can be configured to support a 10Base2, 10Base5 or fiber-optic interface if needed.

UB, which owns a majority stake in NetWorth, will sell the product as the Access/Stax hub, while NetWorth will market it as the Series 3000 TriSegment Stackable Hub.

As many as four unmanaged versions of the product can be stacked with one Simple Network Management Protocol-based model to create a single, 120-node logical repeater supporting a maximum of 15 Ethernet work groups, each with its own 10M bit/sec backplane.

"This architecture in the stackables is an innovation," said

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NSA has public-key chip to complement Clipper Chip

Uses same controversial key escrow system.

By Ellen Messmer
Senior Correspondent

WASHINGTON, D.C. — The algorithm developed by the National Security Agency (NSA) for use with the government's newly proposed Clipper Chip private-key encryption system will also show up in Capstone, a chip for public-key encryption, *Network World* has learned.

Like Clipper Chip, Capstone will use a key escrow system that will enable the government to eavesdrop on encrypted information. Vendors of Capstone-based encryption products will have to register decryption keys with a federal agency that other agencies can retrieve through legal means.

Although Capstone has not been publicly announced, it is at the heart of the encryption system that is to be used in the upcoming Defense Message System (DMS) (see story, p.1).

With the public-key Capstone system, one key is made public, while another is kept secret; the message recipient and sender do not have to exchange keys as they do in private-key systems such as the Data Encryption Standard and Clipper Chip. With Capstone,

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Banyan, others showcase new wares for VINES users

By Caryn Gillooly
Senior Editor

SAN FRANCISCO — The City by the Bay will be a hot spot for VINES users this week as Banyan Systems, Inc. and other vendors unveil new products at the Association of Banyan Users' International Spring '93 conference.

Banyan is expected to announce a VINES version that runs on Hewlett Packard Co.'s HP/UX flavor of Unix. Banyan is also expected to reveal that it will jointly develop a VINES print server with Digital Products, Inc.

Vendors such as Image Engineering, Inc. and Zoomit Corp. will unveil imaging and mail products to work with VINES.

Although Banyan would not comment on its plans, support for HP/UX would fit neatly into the local-area network maker's VINES for Open Unix strategy. Under this plan, Banyan is working to port VINES to a variety of Unix platforms. The more platforms Banyan supports, the more choices users have.

Users familiar with the company's HP/UX support plans were excited about the prospect of being able to tie HP machines into their Banyan nets.

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Briefs

Mail integration. Banyan Systems, Inc. and Microsoft Corp. last week announced plans to integrate Microsoft Mail 3.X with Banyan's Intelligent Messaging Service and its StreetTalk directory service. The companies are working to develop a mail driver that will let Microsoft Mail be used as a front end to Banyan's IMS messaging service. Before this release, Microsoft Mail users could not send messages across a VINES enterprise net or take advantage of StreetTalk capabilities from within their mail program. The driver is expected to be released in the third quarter and will be available from both Banyan and Microsoft.

Compaq, Gupta bask in warmth of downsizing revolution. Demand spurred by the personal computer cost-cutting wars has driven sales of Compaq Computer Corp. microcomputers through the roof. The company reported sales of $1.6 billion for the first quarter ended March 31, a 106% increase over the corresponding period last year. Net income was up 126% to $102 million. Gupta Corp., a vendor of client/server system software for local-area networks, reported first quarter revenue was up 83% to $11 million. Net income shot up from $51,000 in the first quarter last year to $654,000 this quarter.

COS to be OSPF watchdog. The OSPF Interoperability Group last week chose the Corporation for Open Systems International (COS) as its independent testing laboratory. COS will conduct semiannual tests of vendors' implementations of the Open Shortest Path First inter-router protocol and report on how well products fare. COS will work with the OIG's Interoperability Working Group to develop and conduct multilevel test suites based on real-world applications and challenges. Testing is expected to begin this spring.

Ameritech to launch cellular data service. Ameritech last week announced plans to trial Cellular Digital Packet Data (CDPD) technology in Chicago later this year with commercial availability of a service planned for the first half of 1994. Ameritech is teaming with Hughes Network Systems, a cellular network equipment provider, to conduct the trial and provide the service. The CDPD specification was developed by a consortium of cellular providers.

Binary John Hancocks. The Office of Management and Budget has approved the part of the proposed Digital Signature Standard known as the Secure Hash Algorithm (SHA), National Institute of Standards and Technology (NIST) officials said last week. SHA, a public-key signature function, ensures users that electronic documents have not been tampered with. NIST plans to issue SHA as a Federal Information Processing Standard 180 within a few weeks, which would make it a purchasing requirement for the federal government.

HP to enhance OpenView system management capabilities. Hewlett-Packard Co. will soon extend the Unix systems management capabilities of its OpenView management platform. Among the enhancements, expected in about two weeks, is the ability to manage IBM AIX systems such as the RISC System/6000 workstation. HP is also expected to extend its PerfView application to monitor processing performance and capacity. Other additions may include the ability for third-party management applications to access the same database from an OpenView console; out-of-band management; management of wide-area network links; and faster screen access. HP declined to comment.

CONTACTS

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Apple, Novell plan port of Mac-like OS to PC platform

New OS for 486 would let users run Mac, DOS, Windows apps and access AppleTalk, NetWare.

By Fredric Paul
Senior Editor

SAN FRANCISCO — The scramble to respond to Microsoft Corp.'s dominance in operating systems took a new turn last week as Apple Computer, Inc. and Novell, Inc. were reported to be working on a new Macintosh-like operating system designed to run on Intel Corp.'s 486 processors.

Observers said the new operating system would challenge Microsoft Windows and Windows NT by creating a Macintosh equivalent on a 486 personal computer, letting users run Macintosh. Windows and DOS applications on the same machine. Under that scenario, the machines would also have access to AppleTalk and NetWare networking services.

The operating system would combine elements of the Macintosh interface with Novell's DR DOS and take advantage of tight integration into NetWare. Such a hybrid would expand the market for Apple's operating system and Macintosh applications to hundreds of millions of additional machines, while giving Novell operating system solutions for both the network and the desktop.

Representatives of Apple and Novell declined comment on the reports, but it is known that the two are already working together to bring the NetWare architecture to the Macintosh platform *(NW,* March 29, p.8).

Apple, Novell and IBM are also rumored to be working on a joint technology designed to pass objects between platforms across the network. According to Pieter Hartsook, editor of The Hartsook Letter, a Macintosh market research service in Alameda, Calif., such a scheme would more closely link desktop services with network services, facilitate distributed processing on the network and help fight off Windows NT on the server level.

With the rumblings about Apple and Novell, "the anti-Microsoft collaboration hysteria is certainly reaching a fever pitch," said Brent Williams, an analyst at International Data Corp., a market research firm in Mountain View, Calif.

As the release date for Windows NT draws closer, Common Open Software Environment group, NeXT Computer, Inc., Sun Microsystems, Inc., Taligent, Inc. and others have been playing up their own advanced network-capable operating systems.

In this kind of environment, a partnership between Apple and Novell seems inevitable to some. "I would think it would be something that both would be interested in," said Bill Higgs, vice president at InfoCorp, a market research firm in Santa Clara, Calif. "Both companies have a common foe in Microsoft."

Windows already competes against the Macintosh, and the upcoming Windows NT presents a clear challenge to Novell's new NetWare 4.0 network operating system. If Novell and Apple manage to create a truly workable operating system able to run both Macintosh, and DOS and Windows applications, Higgs said, "they could strike a fairly significant competitive advantage compared to what they have now."

However, he cautioned that there are a lot of ifs involved. What kind of performance users could expect, for example, is un-

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DEC harvests workstation clusters with Alpha Farms

By Jim Duffy
Senior Editor

MAYNARD, Mass. — Digital Equipment Corp. last week announced that a number of third-party developers have ported software to its Alpha AXP workstations that enable them to be linked in a cluster configuration to provide mainframe- and supercomputer-class performance.

Called Alpha AXP Farms, the clusters are built by hooking the 64-bit workstations outfitted with third-party software to DEC's 3.6G bit/sec GIGAswitch using 100M bit/sec Fiber Distributed Data Interface media.

In this configuration, Alpha workstations offer high-speed batch and parallel processing for business and technical computing, DEC said.

Software for Alpha Farms provided by independent software vendors falls into three categories: programming environments, batch queuing software and productivity tools.

Programming environments include multithreading tools for application developers. Applications that are developed using these tools will be able to execute multiple tasks simultaneously or in parallel.

The tools include Parallel Virtual Machine from Oak Ridge National Laboratories, the University of Tennessee and Emory University; Network Linda from Scientific Computing Associates, Inc. of New Haven, Conn.; and Express from Parasoft Corp. of Pasadena, Calif.

Batch queuing software allows users to process applications in batch mode by using multiple systems in an Alpha Farm. Batch queuing software for the Alpha Farms includes NQS from Sterling Software, Inc. of Palo Alto, Calif.; DQS from Pittsburgh Computing Center; Utopia LSF from Platform Computing located in Toronto; and Codine from Genias of Germany.

Other tools

Productivity enhancement tools are graphical user interfaces that allow users to view the performance of parallel computational processes.

Such tools include Hence from Oak Ridge Labs and the University of Tennessee; Forge 90 from Applied Parallel Research (APR) based in Placerville, Calif.; and xHPF from both APR and Kuck and Associates located in Champaign, Ill.

Alpha workstations start at about $5,000, and the GIGAswitch has a base price of $30,000.

Corrections: The graphic "Powersoft vs. Gupta" *(NW,* April 19, p.25), reversed the two column heads. The graphic should have indicated that Powersoft Corp. markets PowerBuilder and Gupta Corp. markets SQLWindows.

The story "ATM may help the PBX realize a long-held dream" *(NW,* April 19, p.1), incorrectly identified one of the two people pictured. In the left-hand picture was Mark Juliano of Fore Systems, Inc., not Kevin Oye of AT&T.

In the article "Critics voice concern over AT&T patents on ISDN use" *(NW,* April 5, p.1), the statement "What [AT&T] had patented is too general to hold up in [a lawsuit]" was attributed to Sprint instead of the user that made it.

Texas Instruments' IEF tool gets client/server wings

TI to add PeerLogic middleware to CASE tool.

By Wayne Eckerson
Senior Editor

DALLAS — In an effort to extend its reach in the client/server development market, Texas Instruments, Inc. last week announced that it will bundle middleware from PeerLogic, Inc. into its Information Engineering Facility (IEF) computer-aided software engineering (CASE) tool.

The agreement paves the way for TI's IEF tool to generate applications that work across a wide range of heterogeneous network and computing platforms. Like most CASE tools, TI's IEF was originally designed to assist developers in building large-scale mainframe applications.

"This enhances our ability to serve the client/server market," said John White, president of TI's Information Technology Group.

Under the agreement, TI will distribute PeerLogic's Pipes Platform with IEF and as a stand-alone product. It will also provide worldwide support and maintenance for the middleware product as well as make extensive use of Pipes Platform internally to develop and deploy distributed applications across its global network. In addition, TI purchased a minority equity position in Peer-

(continued on page 48)

Netlink adds SNMP mgmt. to SDLC Link Server line

By Maureen Molloy
Senior Editor

SAN FRANCISCO — Netlink, Inc. last week announced new management capabilities for its line of SNA/SDLC converters that will enable users to manage the devices from a Simple Network Management Protocol-based net management console.

In addition, Netlink said the SNMP agent will include a Systems Network Architecture Management Information Base (MIB) now under development that will enable users to not only monitor, but also control all of their SNA gateways from a centralized SNMP-based management system such as Hewlett-Packard Co.'s OpenView or SunConnect's SunNet Manager.

At the International Symposium on Integrated Network Management here, Netlink said it will add Epilogue Technology Corp.'s SNMP agent software to its SDLCLink Server, a Synchronous Data Link Control-to-Logical Link Control 2 (LLC2) conversion device that lets users attach IBM cluster controllers to token-ring local-area nets.

The agent will work with the new SNA MIB, which will enable it

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Novell buys STI to further NetWare apps development

By Caryn Gillooly
Senior Editor

PROVO, Utah — Novell, Inc. last week took another step to further the development of NetWare applications by announcing the aquisition of Software Transformation, Inc. (STI), a vendor of tools for developing applications that run on a range of platforms.

This acquisition follows closely behind the release of NetWare 4.0, which analysts agreed symbolized not simply the release of another version of NetWare, but rather Novell's first move toward providing a platform on which developers could build more robust applications *(NW,* March 15, p.1). It also follows a recent agreement with HyperDesk Corp. to develop a uniform, object-based interface for NetWare services and resources *(NW,* Jan. 18, p.1).

STI currently sells a set of tools and application program interfaces (API) — dubbed the Universal Component System (UCS) — that let developers write applications that can run unchanged on multiple operating systems.

It also includes an API set that lets programmers write applications that can be used with multiple graphical user interfaces, such as Apple Computer, Inc.'s Macintosh, Open Software Foun-

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PowerSoft powers up

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According to Powersoft officials, they kept the pool of beta users small so they could provide them with a high level of consulting services. But most users said they could do without the support in exchange for testing the software, an option Powersoft will consider.

PowerBuilder 3.0 features facilities that make it easier to manage large development efforts, connectivity to more databases, a built-in local database and an enhanced application repository, among other things.

Powersoft is boosting the development management capabilities through a partnership with Intersolv, Inc., a Rockville, Md., application development tool vendor. Powersoft will offer connectivity software, dubbed PowerBuilder Link for PVCS, that will provide a link into Intersolv's PVCS configuration management and version control package, which Powersoft will resell. That will help users coordinate parallel development efforts.

"Integration with PVCS will give companies more control over multiprogrammer projects," said B.J. Safdie, manager of technical services at PC Strategies & Solutions, Inc., a Parsippany, N.J.-based consulting firm.

Bill Critch, director of business and alliance programs at Powersoft, said the company is providing an open application program interface to enable other version control and related software products to connect to PowerBuilder's object repository, as well.

"PowerBuilder is becoming more of a total development system," said Bob Passarella, manager of technology development at Comdisco, Inc. in Rosemont, Ill., a PowerBuilder 3.0 beta site. "This is especially true with the object repository interface so that other vendors make their products add-ons to PowerBuilder."

Powersoft has also formed a marketing relationship with Netwise, Inc., a Boulder, Colo., vendor of remote procedure call and middleware software, according to Bill Jacobs, director of product marketing at Netwise. Netwise's TransAccess middleware will enable PowerBuilder applications to access mainframe systems.

PowerBuilder has widened database access in 3.0 with support for Microsoft Corp.'s Open Database Connectivity (ODBC) and IBM's Distributed Relational Data Architecture (DRDA). ODBC will let PowerBuilder applications tie into Ingres' Ingres, Digital Equipment Corp.'s Rdb, IBM's SQL/400 and others, while DRDA will provide access to OS/2 Database Manager and others.

PowerBuilder 3.0 also includes an integrated Watcom SQL database from Watcom International Corp. that enables programmers to get PowerBuilder up and running right away. The database, available without a runtime fee, will even make it cost-efficient to bring up PowerBuilder on portable personal computers.

Other PowerBuilder 3.0 features include access to legacy data via PC-to-host tools, such as those from Attachmate Corp., support for Transarc Corp.'s Encina transaction processing monitor and Powersoft's previously announced PowerBuilder Library for NetWare.

The other new products, PowerMaker and PowerView, are designed to generate enthusiasm for PowerBuilder from the end-user level. PowerMaker is a development package that lets end users build applications using predeveloped forms based on PowerBuilder's object technology. PowerView lets workers query databases and generate reports.

Andrew Mahon, a senior analyst at New Science Associates, Inc., a Westport, Conn., consulting firm, said Powersoft and its chief rival, Gupta Corp., have various technical advantages over each other based on their newest products.

However, Mahon added that Powersoft's alliances with other vendors indicate that the company may have a better understanding of how its products must evolve in order to support enterprise applications.

PowerBuilder 3.0 will ship with Microsoft Windows and Windows NT support. Powersoft plans an Apple Computer, Inc. Macintosh version early next year, with Unix and OS/2 versions planned for the future.

The three new products will ship in the third quarter. Pricing will be announced later.

Powersoft: (617) 229-2200.

Powersoft turns on the power

Client/server development tool vendor launches new products due in 3rd quarter.

PowerBuilder 3.0
- Integrated local SQL database from Watcom International Corp.
- Connectivity to Intersolv, Inc.'s PVCS version control and configuration management software
- Open application program Interface to computer-aided software engineering products
- PowerBuilder Library for NetWare
- Integration with Transarc Corp.'s Encina transaction processing monitor
- Support for Microsoft Corp.'s Open Database Connectivity and IBM's Distributed Relational Database Architecture protocols

PowerMaker
- Forms-based development tool for "power users"

PowerViewer
- End-user data access software

Powersoft

SOURCE POWERSOFT CORP., BURLINGTON, MASS
GRAPHIC BY ANNE GIANCOLA

Open road paved with objects

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chairman.

Rymer said part of the growing interest in DOC is due to the failure of the open systems movement to provide users with an efficient and effective way to tie together disparate systems and applications in a heterogeneous network environment. The open systems movement relies too heavily on Unix, is hampered by the standards-making process and focuses on the wrong interfaces to connect systems, he said.

"The goal of the open systems movement is valid, but their approach is doomed to fail," Rymer said. "Distributed object computing can achieve the same goals more efficiently and faster."

Kash n' Karry Food Stores, Inc., a grocery chain based in Tampa, Fla., has been aggressive in adopting distributed object technology. Dennis Read, information engineer at Kash n' Karry, said the company has achieved a 35% increase in worker productivity since implementing its first application using distributed object technology.

Ultimately, Read said DOC will reduce systems development and maintenance costs through software reuse, improve the quality of information provided to inform workers and enable the company to develop new systems rapidly to capitalize on market opportunities (*NW*, June 8, p.1).

While speakers touted the benefits of DOC, some in attendance were trying to fathom the seemingly arcane terminology of object-based concepts and understand how to apply object technology to their computing environments.

"I'm still not sure what an object really is and how it's different from what we've always done. It seems to me to be black magic and witchcraft," said an information systems (IS) manager with 25 years of field experience.

Getting a handle on objects

The reason many users have a difficult time understanding objects is because the objects represent a paradigm shift in the way applications are developed and deployed across networks, according to King Walling, product manager of object technology services at Electronic Data Systems Corp. in Troy, Mich. "Our very success in using the old paradigm makes us resistant to change," he said.

Walling explained that objects model the behavior and attributes of concrete things, such as a customer or invoice, rather than business processes, which is what traditional procedural programming does.

Objects allow IS managers to build distributed systems that evolve gracefully with the company instead of becoming obsolete in five to 10 years when business processes change.

"Our commitment to object technology and distributed computing will enable us to build a foundation that will last long into the future," said Rick Wohleber, managing director of command control at Federal Express Corp.

While the promise of DOC is great, the challenges are significant. Besides a lack of tools for building DOC environments, the biggest barriers are cultural, organizational and financial.

DOC requires IS to completely overhaul the way it develops and deploys software for networked environments, Walling said. Other users said deploying DOC technology would be fruitless unless companies were restructured to allow information to flow more freely across existing divisional, departmental and regional boundaries.

Most significantly, object technology requires larger up-front expenditures to achieve later savings in the form of lower maintenance costs and speedier application development. This "front-loading" of costs can make it difficult to justify DOC projects when corporate budgets are being squeezed.

"A majority of folks have a lot of questions about how to get started and avoid pitfalls, and we don't have all the answers yet," Rymer said.

IBM to patch holes in 6611

continued from page 1

Protocol/Internet Protocol backbones. Among its many features, DLSw prevents congestion and ensures the timely delivery of SNA data across TCP/IP nets.

But DLSw has some shortcomings, including the inability to support PU 2.1 devices linked to the router via SDLC lines. This feature is important for machines such as networked AS/400s because they communicate with each other as PU 2.1 devices using LU 6.2 and APPN but talk to a mainframe by emulating a 3270 device using SDLC.

"Data Link Switching doesn't currently recognize the PU 2.1 device; it only sees [Logical Link Control 2]," said Tom Danninger, manager of wide-area networking protocols for the 6611. That means a PU 2.1 device would have to be tied to the 6611 by an IBM Token-Ring local-area network or via an SDLC-to-LLC2 conversion device, such as Netlink, Inc.'s SDLC Link Server.

The new feature will allow PU 2.1 devices to be connected directly to the 6611. "We actually have the coding done for this feature, but we're testing it to make sure it can be added to 6611s without interrupting existing networks," Danninger said.

Analysts said the effort shows that IBM is trying to eliminate gaps in DLSw technology and offer a more fully featured 6611.

"The new features will open the 6611 to markets it has been closed from in the past," said Tom Nolle, president of CIMI Corp., a Voorhees, N.J., consultancy.

In the same vein, Danninger said IBM is working on adding Ethernet support to DLSw. Currently, DLSw only switches IBM Token-Ring and SDLC traffic onto the router backbone. "There are a lot of NETBIOS devices on Ethernet LANs that need access to the backbone, and we are actively working to add Ethernet support," Danninger said.

IBM is also considering adding support for SDLC-based links between the 6611 and local mainframes.

Today, when a 6611 using DLSw receives a data packet from the wide-area net, it sends the data up to the mainframe via a Token Ring-attached 3745.

"We see this feature as a requirement, but it won't be available this year," Danninger said.

Other 6611 enhancements are expected to include a Qualified Logical Link Control-to-LLC2 conversion feature that would let SNA devices on X.25 nets access the mainframe via a Token-Ring or Ethernet LAN. That would eliminate the need for Network Control Program Packet Switching Interface (NPSI) on the IBM 3745 front-end processor, which is required to link X.25 SNA devices to the mainframe.

Sync Research, Inc. offers a similar feature with its SNA Network Access Controller line.

Also expected soon is support for additional protocols over the 6611's X.25 interface, which today supports only TCP/IP.

Danninger did not confirm which protocols would be added first.

Banyan shows VINES wares

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"We've heard they're testing [VINES over HP/UX], and it's a very big interest for us," said Henry Smith, information systems service business manager at ABB Process Automation, Inc. in Columbus, Ohio. "We've asked to be a beta site."

ABB has a worldwide VINES net with Oracle Corp. databases running on HP machines at various sites. Smith said these machines can be hooked into the net using the Transmission Control Protocol/Internet Protocol, but "that would be a nightmare to maintain." With HP/UX support, an HP machine would appear "as just another server on the net," he added.

Another user who requested anonymity, said, "We're working at a million-dollar project to downsize from our mainframes, and VINES is the platform we've chosen. We're beta-testing [VINES on The Santa Cruz Operation, Inc.'s Unix] now, but we also requested HP support. SCO Unix is good, but the hardware platform is still PCs. HP/UX support will let us use the more powerful [RISC-based] HP hardware."

According to the user, Banyan plans to support other Unix platforms, such as Data General Corp.'s and IBM's Reduced Instruction Set Computing platforms.

ABB's Smith said Banyan is targeting the end of the summer to deliver HP/UX support.

Banyan is also expected to announce an agreement with Digital Products under which the companies will develop a print server for VINES nets. More information was unavailable.

Image Engineering, Inc. in Westerville, Ohio, is expected to bring out FolderXpress, an imaging product that ties into Banyan's Intelligent Messaging Service. FolderXpress lets users send scanned images and documents across the enterprise using Banyan's electronic mail system.

While other imaging products are application-dependent, FolderXpress can pluck images and documents from virtually any application and route them through the network.

FolderXpress, which will be available when VINES 5.5 ships, will be priced at $995 per server.

Also, Zoomit will announce its Enterprise Directory Management Service (EDMS). According to the company, based in Toronto, EDMS stores and manages addresses from different E-mail systems in a central database — something Banyan's own StreetTalk directory service cannot do.

EDMS is available now for $8,000.

Novell buys STI to further apps

continued from page 6

dation, Inc.'s Motif, IBM's Presentation Manager and Microsoft Corp.'s Windows.

"In the face of a growing diversity of operating system choices, we are liberating application developers from the risk of having to narrowly choose which operating system to develop to," said Douglas Donzelli, STI chairman. "Our objective is to provide . . . developers with the technology they need to build quality, heterogeneous [applications]."

Novell executives agreed. "Customers want a standard framework for building distributed network applications that run across multiple hardware and software platforms. Novell and STI intend to provide this capability," said John Edwards, executive vice president of Novell's Desktop Systems Group here.

The UCS product set currently supports Macintosh, Windows, and Novell and Univel's UnixWare, as well as versions of Unix from Digital Equipment Corp., Hewlett-Packard Co. and Sun Microsystems, Inc. STI had been planning to add support for IBM's OS/2 and AIX as well as Microsoft's NT.

Under terms of the agreement, Novell will exchange about 800,000 shares of common stock for all outstanding shares of STI stock. The boards of directors of Novell and STI have approved the definitive agreement, although the merger is pending regulatory reviews and normal conditions of closing.

Pricing for UCS currently ranges from $3,500 to $10,000 per development system.

NSA has public-key chip

continued from page 5

key management is much simpler.

Clipper Chip, for example, enables users to encrypt electronic documents before sending them to the intended recipient, but the recipient must have received the sender's secret key beforehand in order to decrypt the document.

In addition, Capstone will provide the electronic digital signature for "signing" documents electronically, something private-key systems cannot do.

Mykotronx, Inc., the Torrance, Calif., firm that designed Clipper Chip, is also supplying the Capstone chipset. John Droge, vice president of marketing at Mykotronx, an authorized NSA Communications Security vendor, said the firm has already shipped 10,000 Capstone and 20,000 Clipper Chip chipsets.

The NSA intends to equip military users of the DMS with cryptocards — dubbed Tessera cards — containing the Capstone chips so users can enter and activate the public-key encryption and signing features. The Tessera cards are based on the new industry standard PCMCIA, named after the Personal Computer Memory Card International Association, which created the standard. Mykotronx is currently the sole Tessera card supplier.

Last week, the NSA acknowledged that the private-key algorithm to be used with Capstone in the DMS is the same as that used in Clipper Chip. "The [DMS] Type 2 algorithm is the same as the Clipper Chip announced by the Clinton administration," said John Nagengast, chief of strategic systems at the NSA, speaking last week at the Information Systems Security Association's trade show CardTech/SecureTech in Arlington, Va. "It will enable us to go across the government with a common algorithm."

User reaction

The key escrow concept behind both Clipper Chip and Capstone have left many users and vendors worried.

Sandra Lambert, vice president of information security at Citibank, N.A., and Samuel Epstein, president of Racal-Guardata, Inc., said the key escrow system raises the issue of security vulnerability, which could result from a break-in at the site where the escrow keys will be stored.

The Electronic Frontier Foundation (EFF), a public advocacy group based here, has taken the position that the public should not have to rely on the government as the sole source for encryption chips. Last week, the EFF began pulling together a coalition of vendors and users under the banner of its Digital Privacy and Security Working Group to address the issues raised by Clipper Chip. AT&T, which announced that it would include Clipper Chip in its Secure Telephone Device, will participate in the EFF forum.

Government sources last week said AT&T rushed out with its Clipper Chip announcement because the Department of Justice wants to purchase AT&T telephone security devices with Clipper Chip. Last week, AT&T said it based its decision to include the Clipper Chip chipset on faith rather than knowledge. "We've told the government there's a need to establish the credibility of the standard," said Mike Agee, marketing manager for secure products at AT&T.

Although publication of the Clipper Chip specification would not compromise the effectiveness of the algorithm, the NSA said it intends to keep the algorithm secret. "The plan is we would share it with academia on a limited basis," Nagengast said. "I don't believe it's ever intended to be published."

Microsoft's OLE challenged

continued from page 1

code-named Cairo, due out in stages starting next year, according to sources.

In addition, Apple, IBM and Novell, Inc. are expected to announce next month their own version of distributed OLE technology, called Exemplar, sources said. Exemplar will make use of IBM's Distributed System Object Model, compound document technology from Apple and object request broker services that Novell has licensed from Hyperdesk Corp.

"Unix International is trying to create an OLE clone," said Chris Stone, president of the Object Management Group in Framingham, Mass. "Basically, they don't want Microsoft to own this space."

OLE allows users to integrate spreadsheet data and the logic needed to manipulate that data into a second application such as a word processing document. When data is updated in one application, the changes are automatically reflected in the compound document via OLE.

Reuters, for example, wants to embed OLE technology within a variety of Unix and Windows-based financial and news service applications that it markets to the financial industry.

"If Unix International can provide a way to actively link Unix applications across a network in a standard way, it will make our products much more attractive," said Jack Kreger, vice president of information systems at Reuters in Oak Brook, Ill.

UI's RFP also calls for technology that would support OLE between Unix and Windows applications. UI's Doran said Microsoft and other vendors are free to submit proposals for consideration. "We will consider any technology that meets our requirements," he said.

Watching Microsoft's moves

Nevertheless, most systems vendors are concerned about Microsoft controlling key components of distributed object computing technology, which is critical for supporting advanced applications.

"Everybody is concerned about Microsoft," said Dave Cearley, service director of desktop computing strategies at the META Group in Westport, Conn. "Microsoft's competitors want to get a lead on Microsoft, and one way they can do that is by providing distributed OLE functionality."

UI plans to issue a reference implementation of the Application Linking technology early next year, which would mean the first systems built based on the standard could appear in mid-1994, Doran said.

That would put UI's specification in the early lead for dominance of distributed OLE technology. Microsoft is not likely to fully deploy Cairo until 1995, Cearley said. And it currently is not clear when Apple, IBM and Novell plan to deploy a working version of their Exemplar technology. "I don't think [IBM, Apple and Novell] know exactly what they're doing yet," Stone said.

Interestingly, UI and the Exemplar vendors plan to base their products on the Object Management Group's (OMG) Common Object Request Broker Architecture (CORBA), which provides them with a foundation for future interoperability.

Microsoft, on the other hand, plans to use proprietary object technology, according to Cearley. "Microsoft doesn't see OMG's CORBA standard as something they have to follow, unless it gains significantly in the marketplace," he said. "Only then will it deal with interoperability issues."

OMG is just beginning the process of defining object services, such as linking, which will be specified in the next version of the CORBA standard. The actual specifications will not be available for a few years, Stone said.

However, Doran said the UI's Application Linking technology will be made to conform to OMG's OLE specification when it becomes available. As a result, the Application Linking technology will provide users a migration path to implement OMG's object linking service.

"When OMG finishes with CORBA 2.0 and its object services come to fruition, we will have implementations of those technologies available," Doran said.

THE PAINLESS PILGRIMAGE FROM ANALOG TO DIGITAL

Model	Type	Max. Rate	Network	Features
SW56II	Accunet Sw. Digital	56 Kbps	4-wire Sw. Digital	Keypad, Autodialer
DU170	Datapath Sw. Digital	64 Kbps	2-wire Sw. Digital	Keypad, Autodialer
TA110	Terminal Adapter	1 Ch. @ 64K 1 Ch. @ 16K	ISDN	X.25 PAD
TA120	Terminal Adapter	2 Ch. @ 64K 1 Ch. @ 16K	ISDN	Supports Voice & Data
TA220	Terminal Adapter	2 Ch. @ 64K 1 Ch. @ 16K	ISDN	Combines "B" Channels
FT100S	DSU/CSU	56K-1.544Mb	T1/ Frac. T1	Single Port
FT100	DSU/CSU	56K-1.544Mb	T1/ Frac. T1	Dual Port (Expandable)
DDS/MR1	DSU/CSU	56 Kbps	DDS	All DDS Rates
DDS/V.32	DSU with V.32 Modem	56 Kbps	DDS/ Analog	Auto-dial Backup
T1-ESF-CSU	CSU	1.544 Mbps	T1	ESF & D4 Framing
Digital-DBU	Digital Dial Backup	56K-1.544Mb	DDS/ Frac. T1	Universal Digital Dial Backup

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Worth Noting

> "Client/server computing isn't limited to the PC LAN environment because the PC LAN environment won't be able to handle large enterprisewide applications."
>
> **Ken Sobel-Feldman**
> President
> Sage Associates
> Stamford, Conn.

Data Packets

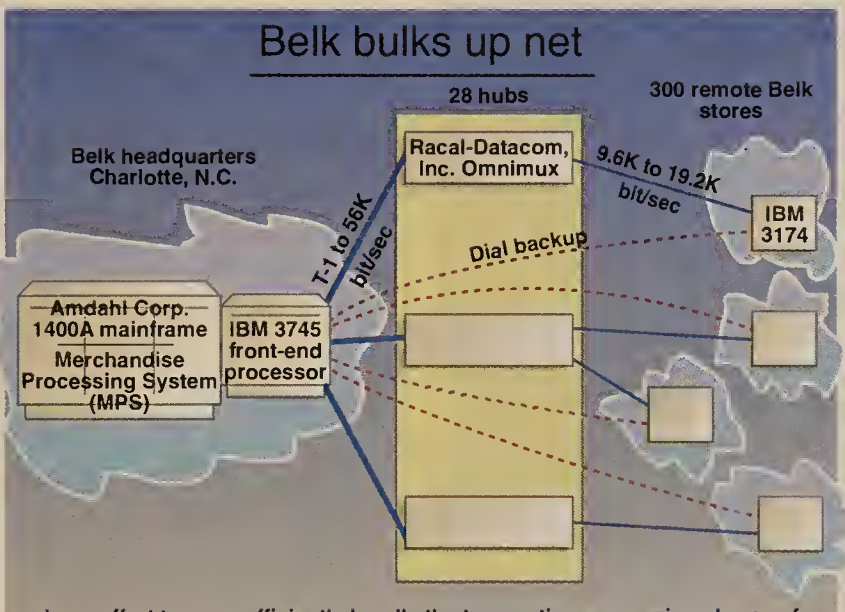
McDATA Corp. of Broomfield, Colo., has added support for Interlink Computer Sciences, Inc.'s DECnet and Transmission Control Protocol/Internet Protocol mainframe-based connectivity software to its LinkMaster 6100 and 6200 Network Gateway products. The McDATA boxes connect Ethernet, token-ring and Fiber Distributed Data Interface local-area networks to the mainframe.

The combination of McDATA's 6100/6200 and Interlink's SNS/Link or SNS/TCP-Access software makes the IBM mainframe appear as a peer node to DECnet and TCP/IP nets, respectively. In addition, it lets DECnet and TCP/IP users gain access to IBM Systems Network Architecture mainframe resources.

Support for the Interlink software is contained in the current versions of McDATA's 6100/6200 operating system software.

McDATA also announced an SNA gateway feature for its 6100 that will let personal computers emulating 3270 devices access IBM SNA mainframes over Ethernet nets. The new software feature is available for $2,500.

McDATA: (303) 460-9200.


Belk bulks up net
28 hubs
300 remote Belk stores
Belk headquarters Charlotte, N.C.
Racal-Datacom, Inc. Omnimux
9.6K to 19.2K bit/sec
IBM 3174
T-1 to 56K bit/sec
Dial backup
Amdahl Corp. 1400A mainframe
Merchandise Processing System (MPS)
IBM 3745 front-end processor

In an effort to more efficiently handle the transaction processing chores of its new SNA-based MPS application and move its entire net from analog to digital communications, Belk Department Stores has installed high-speed lines and Omnimux hubs.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: BELK, CHARLOTTE

Interlink offers fistful of interoperability products

Rollouts target DEC, IBM, TCP/IP environments.

By Jim Duffy
Senior Editor

FREMONT, Calif. — Interlink Computer Sciences, Inc. this week will roll out a slew of products designed to foster interoperability between IBM, Digital Equipment Corp. and TCP/IP environments.

The new products include tools to develop IBM CICS applications that work over Transmission Control Protocol/Internet Protocol and DECnet networks.

Interlink will also unveil an upgrade to a data archiving application that allows DEC users to back up files on an IBM mainframe, as well as a new version of TCP/IP software for IBM MVS hosts.

The new software is intended to address the growing market of products that link users' legacy mainframe and mid-range systems to Unix workstations in order to distribute application processing and save computing cycles.

This market has evolved due to user downsizing, according to Charles Jepson, Interlink president and chief executive officer. "That's where all the growth is," he said.

Heading up the list of new products is the CICS Programmer's Toolkit, which allows developers to build MVS-resident applications that exchange data with systems on TCP/IP networks.

The tool kit consists of an application program interface (API) called CICS/API and software dubbed CICS/Tools.

CICS/Tools is prewritten code that runs on an MVS mainframe and allows CICS and TCP/IP applications to exchange data between predefined locations by using TCP and the User Datagram Protocol (UDP). Applications read and write to configured destination queues, while subroutines manage the data transfer.

When sending data, CICS/Tools reads data from the destination queues and sends it to the TCP/IP application. When receiving data from TCP/IP applications, CICS/Tools places that data into the queues that signal the CICS applications to fetch the data.

CICS/API allows developers to build CICS applications that require frequent, bidirectional conversations and multiple, bidirectional data transfers to TCP/IP hosts. With CICS/API, which also uses TCP and UDP, CICS applications can read or write directly to IBM VSAM files, temporary storage or other programs rather than to the destination queues.

CICS/API allows applications to access services that initiate and terminate connections, transfer and translate data between ASCII and EBCDIC, and notify an application when a data transfer is complete.

(continued on page 16)

Digital net improves user's bottom line

Department store chain moves from analog to high-speed digital to save money, up performance.

By Michael Cooney
Senior Editor

CHARLOTTE, N.C. — Keeping a string of 300 department stores stocked in everything from Barbies, Band-Aids and Brut to the latest in jeans requires a top-notch network.

This is why Belk Department Stores, which operates department stores from Maryland to Texas, decided to dispose of its old-style analog network and build a new high-speed digital net.

The firm recently migrated its Systems Network Architecture net from a 9.6K bit/sec dial-up analog line infrastructure to a high-speed, hub-oriented architecture. The move has saved the company money, increased net response times and eliminated data transmission error problems.

"The old network had been patched and stitched to where we couldn't take it any more," said Jim Sullivan, director of operations and technical services for Belk Stores Services, Inc., the store chain's communications arm. "We knew we were bringing up a major new application that would add hundreds of new terminals and transactions that the old net just couldn't handle."

The application, the Merchandise Processing System (MPS), is a 3270-based program that keeps track of many aspects of Belk's business, from inventory levels to tracking orders. MPS will double the amount of traffic traversing the net, Sullivan said.

The Belk net also handles credit authorizations and other business transactions, such as the transmission of store sales data to headquarters.

In order to handle the increased traffic, the firm began migrating to higher speed digital lines by installing Racal-Datacom, Inc. Excalibur digital access products and Omnimux 7000 multiplexers. The Racal-Datacom equipment is located in 28 "hub" sites around the Belk net.

(continued on page 16)

High-speed modem with high reliability to debut

By Jim Duffy
Senior Editor

NORWOOD, Mass. — Microcom Corp. this week will unwrap a new modem said to maintain a high-speed dial-up connection even under changing line conditions.

The new DeskPorte modem is a V.32bis, 14.4K bit/sec device that supports the Microcom Networking Protocol (MNP) Class 10 for reliable high-speed connections over unstable dial-up lines. The modem also supports V.42bis and MNP Class 5 data compression for an effective throughput of 57.6K bit/sec, as well as V.42 and MNP Classes 2 through 4 for error correction.

MNP 10 allows DeskPorte to sense the condition of the dial-up line and establish a connection at the most reliable speed. The protocol also allows the modem to shift speeds up or down if line conditions change and to maintain the highest speeds possible through the duration of the connection, Microcom said.

MNP 10 is tailored for remote users that need to access and download large data files from corporate local-area network servers, electronic mail systems and bulletin board services.

The DeskPorte modem also supports Delrina Technology's WinFax Lite facsimile software so users can transmit or receive fax documents over a DeskPorte dial-up connection. This software is bundled with the modem at no additional charge.

DeskPorte also supports Delrina's DOS fax software.

DeskPorte costs $499 and will be available in May.

Microcom: (617) 551-1000.

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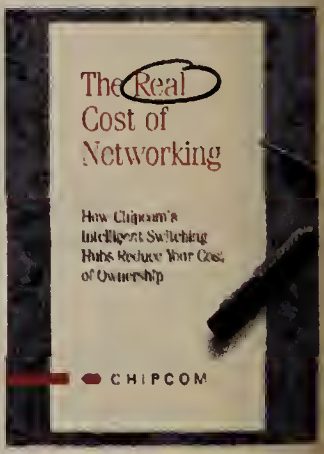
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LOCAL NETWORKING

LAN HARDWARE, NETWORK OPERATING SYSTEMS AND LAN MANAGEMENT

Worth Noting

The installed base of Novell, Inc.'s NetWare 2.X product peaked in 1992 at one million servers and has been decreasing ever since.

Netnotes

The AG Group, Inc. of Walnut Creek, Calif., last week announced Version 2.0 of its EtherPeek and LocalPeek network analysis packages. The new versions include changes to the interface and operational design that allow users to define more parameters and deliver enhanced net analysis.

A new filter mechanism provides more flexibility and control, during or after data capture. A new technology, called Smart Decoders, uses contextual intelligence to automate some packet decoding functions.

Available now, EtherPeek 2.0 costs $795, while LocalPeek 2.0 costs $495. Customers under warranty or with service contracts can upgrade for free. Upgrades for other users cost $120 for EtherPeek 2.0 and $75 for LocalPeek 2.0.

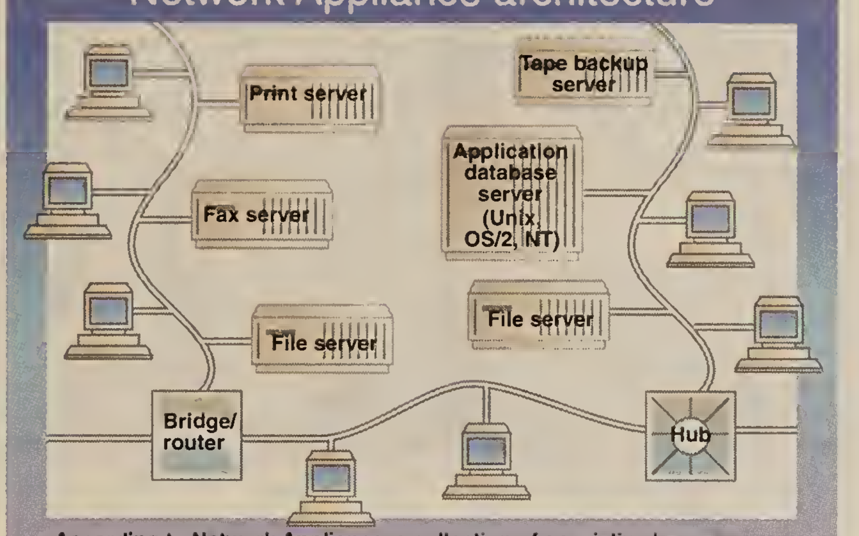
The AG Group: (510) 937-7900.

Micropolis Corp., based in Chatsworth, Calif., last week announced that its RAIDION line of fault-tolerant disk array subsystems is now compatible with Novell, Inc. NetWare 4.0. With new software called RAIDware for NetWare 4.0, RAIDION users can upgrade to NetWare 4.0 without any modifications to the RAIDION hardware.

RAIDION is scheduled to ship in early May. Current users can upgrade to the new software for $199, while new RAIDION units will include RAIDware for NetWare 4.0 at no extra cost.

Micropolis: (800) 395-3748.

Network Appliance architecture



According to Network Appliance, a collection of specialized server "appliances" can provide network services more efficiently than a single general-purpose server.

GRAPHIC BY SUSAN J. CHAMPENY SOURCE: NETWORK APPLIANCE CORP., SANTA CLARA, CALIF.

FAServer file server cuts costs of Unix file services

Offers faster response times, greater reliability.

By Fredric Paul
Senior Editor

SANTA CLARA, Calif. — Network Appliance Corp. this week plans to introduce its first product, FAServer, a specialized Network File System (NFS) file server designed to be faster and less expensive than existing general-purpose file servers on Unix nets.

Based on Network Appliance's proprietary FASware software and standard Intel Corp. 486 Extended Industry Standard Architecture (EISA)-bus hardware with up to seven 1G-byte hard drives, the FAServer offers faster response times, greater reliability, Redundant Array of Inexpensive Disks (RAID) Level 4 data integrity, fast backups, 30-minute installation and 30-second reboots.

Network Appliance claims that its best response time is 7 msec, compared to 21 msec for competing systems from Auspex Systems, Inc., also based in Santa Clara. FAServer's total throughput is a little less than Auspex's NS line of servers, however, and NS servers can support as many as 19 disks. FAServer prices range from $17,000 to $40,000, compared to as much as $200,000 for NS servers.

"All we do is support and service NFS requests," said Charles Perrell, executive vice president of the year-old company. "If that's all you want to use the machine for, [you can] design it for that and strip out all the superfluous hardware and software" for services such as database access, printing, electronic mail and communications. That way, a file server appliance can be faster, cheaper and more reliable. "We think that's the future for networks," he added.

Walter Johnson, a senior consultant at New Science Associates, a research firm in San Mateo, Calif., agreed. "It makes sense to me that servers [will] become more and more specialized," he said. "Network Appliance has the right idea [but] they have a little way to go in meeting their goals," especially in the area of manageability in a mixed environment.

Remote management is now available only via Telnet, for example, and FAServer will not support the Simple Network Management Protocol until early next year. But Johnson saw no reason why the company will not quickly solve those issues. "It's not new technology," he said.

Meanwhile, "FAServer works really well," said beta-tester John Mayes, of John Mayes and Associates, an open systems consultancy in Redwood City, Calif. Benchmarked against the Sun Microsystems, Inc. SPARCStation 10, Mayes found FAServer to run as much as six times faster.

"It doesn't have the total capacity of Auspex NS servers, but the read/write performance is there and the latency is lower, so it's better," Mayes said. "And it's cheaper." There is a definite niche for this machine in companies with 20 to 50 fast worksta-

(continued on page 16)

Wall Data to extend Rumba connectivity

Gateway enhancements support Banyan's VINES; new tool links Rumba to Powersoft's PowerBuilder.

By Caryn Gillooly
Senior Editor

SAN FRANCISCO — Wall Data, Inc. this week is expected to expand its host connectivity horizons with the addition of Banyan Systems, Inc. VINES support and additional TCP/IP support for its Rumba Gateway System.

In addition, the company last week introduced Rumba Tools for PowerBuilder, a Microsoft Corp. Windows-based program that eases the development of applications that let users access host resources by enabling programmers to keep a host session open during development.

Rumba is Wall Data's family of IBM host connectivity software that allows users to access host applications from their local machines. Any of the Rumba products for mainframe Application System/400 connectivity can work in conjunction with Wall Data's Rumba Gateway System or with other vendors' Systems Network Architecture gateways.

Wall Data is expected to unveil its Rumba Gateway System 2.1 with newly added VINES capabilities at the Association of Banyan Users International Spring '93 conference and exhibition here.

"With the new release, VINES users will be able to use Rumba with no changes to VINES," said David Veneski, business unit manager for Wall Data in Redmond, Wash.

According to Veneski, before this release, VINES users could implement Rumba on a network's personal computers, but if they wanted to use the Rumba Gateway System, they had to add a Transmission Control Protocol/Internet Protocol stack.

"There were other gateway products VINES customers could use, but now we can offer the Rumba client as well as the Rum-

(continued on page 22)

SMCC simplifies service, support with SunSpectrum

By Fredric Paul
Senior Editor

MOUNTAIN VIEW, Calif. — Continuing the emerging trend toward using support as a competitive advantage, Sun Microsystems Computer Corp. (SMCC) dramatically streamlined ordering and pricing of worldwide service and support options for its more than 500,000-system installed base.

SMCC's announcement follows on the heels of sweeping new support policies recently announced from Apple Computer, Inc.

SMCC's new program, called SunSpectrum, supports the entire enterprise, covering software, hardware, network applications and interoperability with products from other vendors. By simplifying a confusing maze of support options, SunSpectrum will enable SMCC to devote more resources to support and service, and less to pricing and administration, said Cindy Williams, strategic marketing manager for worldwide customer support.

Also, it will make it easier for customers to do business with SMCC by reducing purchase and administration hassles, she said.

"If I were [SMCC's] competition, I think I would take a good look at this," said Jody Ryden, a senior analyst at InfoCorp, a market research firm in Santa Clara, Calif. It's a big improvement over the industry standard, she said, and customers are going to ask their own vendors for a response.

That could put many vendors in a difficult position. "Digital is just outrageous," Ryden said. "You need an advisor just to figure out the price list. And everybody's like that to some extent."

J.B. Wood, vice president of worldwide marketing for Prognostics, which conducts customer satisfaction surveys, said that over the past few years, custom-

(continued on page 16)

Fast, faste

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It's true. No other Micro Channel® Token-Ring card can beat the zip of our new LANStreamer™ MC 32 Adapter. Not one. That's because it's based on a unique, new 32-bit chipset architecture. Just how fast is it?

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LANStreamer is just the latest in a long line of industry-leading IBM LAN adapter technologies. It offers superior performance and increases CPU efficiency by freeing the CPU for other tasks and new users. That means blazing response times, enhanced network productivity, and the capacity to handle multimedia applications in the blink of an eye. Driver support for all major PC operating environments is included, and of course, LANStreamer is compatible with all standard Token-Ring configurations. You'll also discover that it is very competitively priced and backed by IBM's comprehensive service and support.

Too much, too fast? To find out more about the LANStreamer MC 32 Adapter, just call 1 800 IBM-CALL, ext. S43. But hurry, LANStreamer is going fast.

IBM®

SMCC simplifies service, support

continued from page 13

ers have begun complaining about the one-size-fits-all service options offered by many companies.

Although still small, the number of personal computer and workstation users citing support as a reason they selected one product over another more than doubled last year. This holds true across product lines, Wood said, including networking. Even more important, support considerations drive a significant number of users to stay with a vendor.

To address these concerns, SunSpectrum consolidates the company's thick price book into four levels of service — Bronze, Silver, Gold and Platinum — with as many as 200 options. According to the company, SunSpectrum offers a much simpler approach than offerings from competitors such as Hewlett-Packard Co. and IBM, which charge customers a unique price to support each configuration and an additional fee for each peripheral device.

With SunSpectrum's new one-price-per-box strategy, most customers will pay about the same as they did under SMCC's old support schemes, Williams said, while some will pay more and others less.

The single fee covers support for an entire system, including the monitor, all disk drives, Sbus cards, memory and other related hardware, as well as SMCC software.

Prices range from $41 per month for Bronze coverage of a SPARCclassic workstation to a $5,000 base charge plus $2,100 per month for Platinum support of a SPARCcenter 2000 server with one system board.

> Support considerations drive a significant number of users to stay with a vendor.
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The new Bronze level includes backup phone support and replacement parts for users that mostly maintain their own systems, while the Silver and Gold packages add new services. The Platinum level, originally introduced in November 1992 as SunService 2000 for the SPARCserver 2000, is designed to offer complete enterprisewide support in mission-critical environments. There is even a 99% server uptime guarantee.

SunSpectrum also lets customers set the priority of telephone or on-site response to their service requests when they call, not just when they sign a service contract. While some observers worry that every call will become a top priority, Prognostics' Wood said early users of the new program "have been very good about it."

The new support arrangements also include EarlyNotifier, which consists of periodic bug reports and work-arounds, as well as on-line and CDROM access to SunSolve, the company's internal problem resolution database. On-site support reviews are also available.

SunSpectrum is available directly from SMCC or through qualified resellers either as a primary service option or a backup to their own support.

Some of SMCC's customers have been enrolled in beta versions of SunSpectrum for a couple of months, Williams said, and the new program is now available throughout the U.S., Canada and most of Europe. SMCC plans to roll it out to the rest of the world by the end of this year.

SMCC: (415) 960-3600

FAServer file server cuts costs

continued from page 13

tions, he concluded.

The FAServer hardware includes a 50-MHz 486 processor, 16M bytes of random-access memory and 2M bytes of nonvolatile RAM, eight EISA expansion slots, connections for one to two Ethernet networks, a Small Computer System Interface (SCSI) controller, two to seven 3.5-in. 1.08G-byte hard drives and a floppy drive.

Instead of the standard Basic I/O System, the FASware software includes its own real-time kernel that runs native on the 486. FASware consists of about 80,000 lines of code, Perrell said, compared to almost five million lines of code for typical Unix-based servers. It also boasts its own command interface, a RAID manager, SCSI disk driver and Ethernet driver, as well as support for the Transmission Control Protocol/Internet Protocol and NFS protocols.

FASware's most important components are the proprietary Write Anywhere File Layout (WAFL) system and Snapshot backup.

The WAFL file system treats the entire RAID system as a single partition, writing across all the disks simultaneously. This avoids the performance loss typically associated with updating the parity disk on RAID systems, Perrell said. Snapshot works like virtual memory to make a "virtual copy" of the disk in a few seconds, he explained.

Since WAFL does not write over existing blocks of data, that virtual copy remains accurate until purged from the system. Systems administrators can save up to 20 logical copies of the file system on the RAID system, as well as schedule Snapshot every few minutes to avoid overloading the disks.

Snapshot lets network administrators back up the disks without interrupting services, and users can access Snapshot on-line to recover data.

The FAServer for NFS will ship in June, Perrell said. Network Appliance plans to add Fiber Distributed Data Interface capabilities two months after that. The company is also looking at protocols such as Apple Computer, Inc. Macintosh, Novell, Inc. NetWare, and Microsoft Corp. Windows NT but has not yet decided which one to pursue next.

The next version is due out near the end of this year or the beginning of 1994, Perrell said, and will likely include support for as many as four Ethernets and data compression.

Network Appliance: (408) 562-1900.

Interlink offers interoperability

continued from page 11

The CICS Programmer's Toolkit is priced from $6,350 to $21,897 and will be available in May.

The DEC connection

Another new software product, the CICS DECnet Application Program Interface, allows developers to build CICS applications that can run over a DECnet network. This API is intended to allow DECnet users to access CICS applications on an IBM mainframe.

Pricing and availability of this API has not yet been determined, Interlink said.

Also on the DEC front, Interlink will unwrap a new release of its DataStore software for backing up DEC VMS files on IBM mainframe tape.

DataStore Version 2, which works over Fiber Distributed Data Interface networks, conforms to IBM's System Managed Storage concept for centralized, automated data backup and archiving, according to Interlink.

System Managed Storage is part of IBM's SystemView systems management initiative.

DataStore Version 2 is priced from $1,500 to $13,500 and is available now.

Finally, Interlink will roll out a new version of its TCP/IP for MVS host software, dubbed SNS/TCPaccess, that supports the Simple Network Management Protocol and FDDI.

> SNS/TCPaccess can now send performance statistics to any SNMP management console.
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As an SNMP agent, SNS/TCPaccess can now send performance statistics to any SNMP management console. It supports SNMP Management Information Base II variables so SNMP consoles can view specific management attributes of SNS/TCPaccess.

FDDI driver support will enable users to attach SNS/TCPaccess hosts to a 100M bit/sec FDDI local-area network.

SNS/TCPaccess is priced from $18,131 to $75,778. It will be available in the third quarter.

Interlink: (510) 657-9800.

Get in touch with the R.A.F.

NETWORK WORLD'S R.A.F. READER ADVOCACY FORCE

The Reader Advocacy Force (R.A.F.) tackles the tough issues facing our readers — the buyers of network products and services. As consumer advocates, we want to hear about any problems you've encountered with products, service and support, or interoperability of equipment, as well as any other concerns you have.

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Net improves bottom line

continued from page 11

These sites are connected to the mainframe here via T-1 or 56K bit/sec leased lines. Belk stores are connected to the hubs via 9.6K bit/sec or 19.2K bit/sec leased lines in groups of two or three.

The network has been in place for a few months now and already the firm is seeing impressive results. Although Sullivan did not have specific figures, he said the new network has saved the company about 5% to 10% in data communications line charges.

"The analog service had a lot of transmission errors that would cause our remote stores to repeatedly resend data," Sullivan said. "We can now send data between the mainframe and the stores in the field twice as fast and with very few errors."

Response time between the stores and the mainframe has dropped from between three and five seconds to two and three seconds. "The new net and equipment has changed the way we do business because we can now proactively respond when stores are in need of merchandise quickly," Sullivan said. "The old network was slow and couldn't handle the transactions we put the new net through today."

The Belk net also marks the first time BellSouth Telecommunications, Inc., MCI Communications Corp. and Racal-Datacom have worked together to install a customer's net. The companies have comarketing agreements with one another that let them offer users one-stop shopping for their local- and wide-area data communications systems and services.

BellSouth provides the local telephone service, while MCI furnishes the long-distance service. "They worked together to give us one proposal, which made planning a lot easier," Sullivan said.

The firms also helped set up some remote stores that Sullivan's small networking staff would not have been able to get to for months. "By working together, the companies let us put the network together quicker than we could have by ourselves," he said.

Sullivan expects the new network to give users plenty of power for two to three years. "We may look at increasing local line speeds to some of our busier stores, but we're pretty much set for a while," he said.

INTERNETWORKS

LAN-TO-LAN AND LAN-TO-WAN EQUIPMENT AND STRATEGIES

Worth Noting

> "Wellfleet is the Avis of the router industry. Because Cisco is the clear industry leader, [Wellfleet] has continually tried harder in the performance arena in an effort to distinguish themselves."
>
> **Paul Callahan**
> Senior analyst
> Forrester Research, Inc.
> Cambridge, Mass.

Link Notes

Coral Network Corp. last week penned a three-year, $10 million OEM agreement with **Cray Communications** whereby Cray will resell Coral's high-end Backbone Express (BX) 1000 and BX 2000 routers through its global distribution channels. The Coral product line will be available through Cray's direct sales, value-added reseller channel and indirect distribution beginning June 1.

Also, the two companies will jointly develop the BX architecture to provide enhancements such as additional wide-area network interfaces and voice support.

For additional information, contact Coral at (508) 366-3600.

3Com Corp. and **Cascade Communications Corp.** announced last week a joint marketing and development agreement aimed at addressing the problems users face when building enterprisewide internetworks.

By combining 3Com's NetBuilder routers and Boundary Routing System Architecture with Cascade's STDX family of

(continued on page 24)

Connectivity options added to Allied Telesis hub line

E-net hubs offer FOIRL, 10Base2, RJ-45 support.

By Skip MacAskill
Senior Writer

MOUNTAIN VIEW, Calif. — Allied Telesis, Inc. this week will roll out three additions to its 3600 family of Ethernet hubs that will provide users with more flexible connectivity options, including fiber, 10Base2 and RJ-45 support.

The new AT-3606F hub is a six-port device that supports Fiber Optic Inter-Repeater Link (FOIRL) connections as well as one backbone port that can support an attachment unit interface, BNC, unshielded twisted-pair or FOIRL connection. The FOIRL hub, which also supports the Simple Network Management Protocol, is available now for $3,195.

The AT-3608 hub has eight 10Base2 thin-wire Ethernet ports and one modular backbone connection that offers the same media choices as the FOIRL hub. The 3608, which also supports SNMP, will ship next month and cost $2,795.

The third addition is the AT-3612TR hub, which is a 12-port 10Base-T device that has RJ-45 connectors and complements the existing AT-3612T, which also offers 12 ports but through a 50-pin telephone company-type connector. Scheduled to ship in May, the 3612TR will cost $1,595.

> The AT-3608 hub offers the same media choices as the FOIRL hub.
>
> ▲▲▲

In a related announcement this week, Allied Telesis will also

(continued on page 24)

Make, Wellfleet ally on tool for router-based nets

By Jim Duffy
Senior Editor

MOUNTAIN VIEW, Calif. — Make Systems, Inc. and Wellfleet Communications, Inc. have announced a technology sharing agreement aimed at producing a network design tool for router-based networks.

Under the nonexclusive arrangement, Wellfleet will provide information on its family of routers that Make will use to develop Wellfleet-specific device libraries for its NetMaker network design system.

The device libraries will simulate the performance of Wellfleet routers so users can assess the impact of network changes on traffic loads and response times, as well as gauge susceptibility to link failures.

The Wellfleet device libraries, which had been expected (*NW*, Sept. 28, 1992, p.20), will be complemented by device libraries for Cisco Systems, Inc. routers in the future. Wellfleet, meanwhile, will install NetMaker at its product demonstration center in Billerica, Mass., to assist in the sale of its products.

Until now, NetMaker only allowed users to simulate time-division multiplexer (TDM) networks. Make has arrangements with Ascom Timeplex, Inc., Network Equipment Technologies, Inc. and Newbridge Networks, Inc. that are similar to the Wellfleet agreement.

Make said it added routing simulation to its network design system because of the popularity of multiprotocol routers in its TDM customer base. "The marketplace is moving very aggressively into internetworking," said Make President Stephen Howard. "That marketplace is about 10 times the size of the TDM marketplace."

For a 50-node Wellfleet net, NetMaker will cost $46,000. Existing NetMaker customers can purchase a 50-node Wellfleet router simulation package for $17,000. The Wellfleet device libraries are available now. ◼

> "Performance is the router vendor's equivalent of an auto manufacturer's spec of how long it takes a car to accelerate to 60 [mph]. You won't buy a high-performance vehicle solely based on that criterion, but you're not going to buy a car that takes 10 minutes to do it, either."
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>
> **Kevin Tolly**
> **President**
> **InterLAB**

Wellfleet wins router performance crown

Takes title from Cisco in independent testing, but one-upmanship still reigns in router contest.

By Maureen Molloy
Senior Editor

CAMBRIDGE, Mass. — Wellfleet Communications, Inc. won the router performance crown from Cisco Systems, Inc. in an independent test conducted at Harvard University's Network Test Device Lab.

Wellfleet's Backbone Concentrator Node had an aggregate throughput of 145,877 packet/sec when forwarding 64-byte packets from 20 Ethernet local-area networks, and 175,000 packet/sec from 24 Ethernets, according to Scott Bradner, a Harvard net consultant.

This compares to the 115,927 packet/sec rate the Cisco 7000 Internetwork Router supported in the same 20-Ethernet test here several months ago.

Other vendors targeting the high-end router market — including Coral Network Corp. with its Backbone Express 2000 and Proteon, Inc. with its CNX 600 — claim similarly impressive performance, although their products have yet to be independently tested.

Regardless of who ultimately runs away with the performance title, analysts warn that the numbers have to be kept in perspective. "Performance is a threshold criterion because if it's fast enough for the task, it's fast enough period," Bradner said.

Kevin Tolly, president of InterLAB, an independent network test laboratory and consultancy in Sea Girt, N.J., agreed. The greatest value gained in determining a router's aggregate throughput lies in its ability to illustrate the overall quality of the router.

"Performance numbers show how powerful and streamlined the router engine and other internals of the router are, and from that, one can extrapolate its overall quality," Tolly said.

Other considerations

According to most analysts, users should examine other equally important features such as connectivity, manageability, scalability and fault-tolerant capabilities when comparing top-of-the-line routers.

"As a rule of thumb, any router that can support 100,000 packet/sec is playing in the same high-end ballpark and the user can feel comfortable that, as his network evolves, he won't top out on horsepower," said Val Sribar, a senior analyst at META Group in Reston, Va. "The vendors will continue to surpass each other time and again, so absolute numbers aren't that relevant."

The exception to the rule is in large campus, collapsed backbone nets and, in the future, Asynchronous Transfer Mode networks, Sribar said. In those nets, the backplane of the router could easily become the bottleneck, so the greater the aggregate performance, the better.

Certain configurations, however, will make key attributes critical. Fault tolerance will be important for a router being used

(continued on page 24)

Announcing the first network printer

Operating System	*Topology*
Novell Netware	**Ethernet/802.3* *Token Ring (4/16 Mbps)*
Microsoft® LAN Manager	**802.3* *Token Ring (4/16Mbps)*
Windows for Workgroups	**802.3* *Token Ring (4/16 Mbps)*
Windows NT	**802.3* *Token Ring (4/16 Mbps)*
IBM LAN Server	**802.3* *Token Ring (4/16 Mbps)*
AppleTalk	**LocalTalk* **EtherTalk*
*HP-UX***	**Ethernet*
*SunOS***	**Ethernet*
*Solaris***	**Ethernet*
SCO UNIX®	**Ethernet*

Multiple environments are no longer worlds apart. Even if you have Novell Netware on one network, HP-UX on another and EtherTalk on a third, the new HP LaserJet 4Si MX printer easily connects across platforms. Automatically.

The HP LaserJet 4Si MX printer comes out-of-the-box preconfigured for multiple environments. There's nothing more to do than plug-and-play. All interfaces are simultaneously hot, making switching so seamless, end-users won't even notice.

What's more, HP's LaserJet 4Si MX printer is ready to handle whatever needs come down the

*Standard in the HP LaserJet 4SI MX printer. **For operating HP-UX, SunOS or Solaris, a one-time purchase of $199 in configuration software is required. Adobe and PostScript are trademarks of Adobe Systems Inc. which may be registered in certain jurisdictions. Microsoft is a U.S. registered trademark of Microsoft Corporation. UNIX is a registered trademark of UNIX System Laboratories Inc. in the U.S.A. and other countries. †In Canada call 1-800-387-3867, Ext. 7299.

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pike. More operating systems? No problem. As your network system continues to evolve, the capabilities of this printer are no longer just impressive. They're indispensable.

The HP LaserJet 4Si MX printer is loaded with features that define state-of-the-art. HP's enhanced PCL5 and genuine PostScript™ Level 2 software from Adobe™ come standard. Printer environments are saved while switching. Setup is a cinch with network software utilities and drivers included in the box. And, if you need any reassurance about trouble-free operation, you have it in our Simple Network Management Protocol (SNMP) support.

At 17 ppm, this is the fastest LaserJet ever, with I/Os and RISC-based formatter capabilities matched to support its speed. It delivers impeccable 600 dpi print quality—thanks to HP's microfine toner and Resolution Enhancement technology. Plus, it comes standard with two 500 sheet input trays.

But what if you don't need the full capabilities of the HP LaserJet 4Si MX printer right away? HP offers another printer that's probably a perfect fit. The HP LaserJet 4Si printer delivers the identical 17 ppm performance and superb 600 dpi print quality. It also has room to grow. The two MIO expansion slots let you add HP JetDirect network interface or third party cards. And you can add on Adobe's genuine PostScript Level 2 software and SIMM memory modules, as you need them.

To find out more about the multiple-network HP LaserJet 4Si MX printer and the upgradable HP LaserJet 4Si printer just call 1-800-LASERJET, Ext. 7299.† Capabilities this advanced make a world of difference—in any environment.

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GLOBAL SERVICES

DOMESTIC AND INTERNATIONAL VOICE/DATA SERVICES, ACCESS EQUIPMENT AND REGULATORY ISSUES

Worth Noting

WilTel last week announced that it has installed StrataCom, Inc. switches in Portland, Ore., and Anchorage, Alaska, that will enable it to extend its frame relay service to users in Alaska.

Carrier Watch

GTE Mobilnet last week announced that it successfully completed a $115 million conversion of its digital cellular network to a more advanced digital switching system in 13 California counties.

More than 200 individual cell sites (the individual radio transmitters and receivers that pass calls from area to area) and nine central switching systems were converted to Autoplex System 1000, a digital switching system from AT&T Network Systems.

The conversion is part of a three-year, $600 million nationwide effort that will be completed this year by GTE Mobilnet.

The upgrade will provide 30% greater capacity and improved operational efficiency, without requiring users to purchase new digital cellular telephones. Benefits include greater call clarity and quality, faster call processing, fewer dropped and blocked calls, and the elimination of "click tones" after dialing.

The conversion also enables GTE Mobilnet to monitor areas of heavy usage and adjust the network to accommodate increased calling, address overall system problems more quickly and perform network tune-ups remotely in a fraction of the time previously required.

In addition, the new system

(continued on page 22)

Advanced network services forecast

Service	1993		1998		2003	
	Revenues	Share of total revenues	Revenues	Share of total revenues	Revenues	Share of total revenues
Frame relay	$654 million	94%	$9.884 billion	38%	$970 million	1%
SMDS	$35 million	5%	$9.675 billion	37%	$5.542 billion	4%
ATM	$7 million	1%	$6.397 billion	24%	$84.099 billion	60%
Broadband ISDN	—	—	$262 million	1%	$47.938 billion	35%
Total	**$696 million**		**$26.218 billion**		**$138.549 billion**	

Revenues from frame relay and Switched Multimegabit Data Service will peak in 1998, then erode over the next 5 years. Meanwhile, Asynchronous Transfer Mode and broadband ISDN services will start to soar in the mid-1990s.

GRAPHIC BY SUSAN J. CHAMPENY

SOURCE: ELECTRONICAST CORP., SAN MATEO, CALIF.

SW Bell private-line mgmt. service provides flexibility

Lets users reconfigure their portion of the network.

By Bob Wallace
Senior Editor

ST. LOUIS — Southwestern Bell Telephone Co. last week announced a new service that lets users monitor, reroute and integrate portions of their voice and data communications nets from an on-site console.

The service, called Transport Resource Management (TRM), is based on Newbridge Networks, Inc. software running on a workstation on the customer's premises and multiplexers in Southwestern Bell's central offices.

It gives private net users the ability to reconfigure their portion of Southwestern Bell's network on demand and supports features including subrate multiplexing, voice and data bridging, voice compression and frame relay.

"Some of our largest customers came to us and requested more flexibility in managing their private-line networks," said Richard King, marketing development manager of TRM for Southwestern Bell. "And they wanted more control of the Southwestern Bell services they use."

TRM works with Southwestern Bell services ranging from low-speed analog private lines to MegaLink Custom, a fiber-based T-1 network service. The service requires a Sun Microsystems, Inc. workstation equipped with network management software developed by Newbridge.

Later this year, users will be able to run the software on an X Window terminal or personal computer running X Window.

The on-site system is linked via a 56K bit/sec private line to a Sun SPARCstation in a Southwestern Bell central office running the carrier's network management system.

Once on-line, the user can activate any of several standard features, including the creation of connections ranging in size from 64K to 1.544M bit/sec as needed. The SPARCstation instructs the Newbridge multiplexers in its central offices to establish the links almost instantaneously.

Recovery features

Network managers can use the on-site workstation to create a map of the firm's network and establish three different fault recovery features — Rapid, Automatic Rerouting (AAR) and Dynamic Downspeeding.

With the Rapid feature, the network manager can set up a primary circuit between two sites and a geographically diverse backup link that remains idle until the first connection is knocked out.

AAR lets users prioritize each link so that in the event of a disaster, the most important links are restored first. If necessary, the workstation can be used to instruct the multiplexers to restore channels on a downed link using low-priority connections on a second link that were not affected by the outage. "We haven't had this capability before in our network," King said.

The Dynamic Downspeeding feature is used to downshift applications to lower speed channels during disasters.

With each of the three fault re-

(continued on page 22)

AT&T offers deal for its 800 service

Carrier targets most 800-service users with new incentive providing several rerouting options.

By Bob Wallace
Senior Editor

BASKING RIDGE, N.J. — AT&T last week announced a service guarantee that gives users new ways to make sure calls to busy or unattended 800 lines don't go unanswered.

AT&T's Never Miss A Call Guarantee covers most AT&T 800 users and includes options for businesses with multiple locations as well as single-site firms.

With the guarantee, AT&T agrees to reroute toll-free service calls to a second user or carrier site, over an alternate path to the same site or to a second number at the original destination.

The first-of-its-kind guarantee is the latest in a long list of incentives and features AT&T has implemented in an effort to make its 800 services more reliable since 800 portability is just around the corner — scheduled for May 1.

"Our 800 customers told us that they wanted us to deliver all their calls all the time," said Patricia Traynor, Megacom 800 product director with AT&T. "[The guarantee] represents the continuation of our drive to demonstrate 800-reliability leadership."

By upgrading the 4ESS switches in its long-distance network a few years ago to support three new 800 safeguards, AT&T laid the groundwork for the Never Miss A Call Guarantee.

The first safeguard, Real-Time Network Routing, enables the carrier to boost the number of call paths through its net. The second, Split Access Feature Egress Routing, allows calls to be sent over a second route to their original destination. Under the third safeguard, Alternate Destination Call Routing, calls are sent

(continued on page 22)

Carrier launches alliance program to propel ISDN

ATLANTA — In an effort to jump-start sales of ISDN in its nine-state region, BellSouth Telecommunications last week detailed a program under which it will forge alliances with systems integrators and equipment vendors to provide turnkey ISDN networks.

Under its ISDN Applications and Solutions Plus (IAS+) Initiative, BellSouth will contact systems integrators as well as hardware and software vendors, who, likewise, will contact BellSouth for Integrated Services Digital Network sales.

"[The program] brings together a whole cross-section of companies that provide the various components of total ISDN solutions," said Ted Shelton, director for ISDN and switched digital services at BellSouth. "[The IAS+ Initiative] represents a major milestone in providing customers with a complete ISDN solution."

In Nashville, one of the first two cities covered by the program, the company will work with 12 ISDN systems integrators and 25 hardware and software vendors.

Systems integrators that will participate under the program include Business Automation Systems, Cameron Communications Group, Dalcon Computer Systems and NetResults. Equipment vendors will include Apple Computer, Inc., Ascend Communications, Inc., Cisco Systems, Inc., Compression Labs, Inc., Microcom, Inc., Novell, Inc. and Teleos Communications, Inc.

In Huntsville, Ala., the second city covered by the program, BellSouth will work with 11 systems integrators and 23 equipment and hardware vendors. Systems integrators include Comm-Plus Technologies, Computer-Land of Huntsville, Digital Technologies, Inc. and Network Services Group.

Equipment vendors partici-

(continued on page 22)

Carrier launches alliance program

continued from page 21

pating in the program include the same vendors as in Nashville, as well as Combinet. Inc., Hayes Microcomputer Products, Hitachi America, Ltd., Motorola, Inc. and Sun Microsystems, Inc.

Future plans

BellSouth expects to extend the program to users in Atlanta, Charlotte, N.C., Miami and New Orleans in the next few months, according to a BellSouth spokesman.

By year end, 48 metropolitan areas representing 313 central offices in the carrier's nine-state region will have access to ISDN.

The percentage of telephone lines with access to ISDN in BellSouth's region is expected to hit 47% by year end and 59% by the end of 1995.

BellSouth's ISDN offerings include ESSX ISDN Basic Rate Interface service and MegaLink ISDN, its Primary Rate Interface service.

AT&T offers 800 service guarantee

continued from page 21

to a secondary site if the first is busy or knocked out.

The three service options offered under the guarantee are Multiple Site Application, Single Site Application and Alternate Multiple/Single Site Application.

Multiple Site Application lets multisite businesses have 800 calls routed to a secondary location when, for example, no one answers at the first number.

Customers can choose to have unanswered calls redirected to one of three AT&T destinations: AT&T Voice Mail; a network-based voice response offering called InfoWorx; or AT&T American Transtech, an AT&T 800-service bureau in Jacksonville, Fla.

InfoWorx provides callers with information, such as product pricing and availability, via voice response units in the AT&T network. Callers can also leave their name and telephone number for a callback.

Users that choose to have calls rerouted to American Transtech can have agents at the service bureau field the calls and complete the requested transaction.

With Single Site Application, AT&T provides multiple routes into the customer's site. If one route is knocked out, calls are sent to the site using a secondary route.

Alternate Multiple/Single Site Application provides automatic rerouting of calls when too many converge on a single number. The calls are routed to a less congested number at the main customer site or to another site predetermined by the user.

The Never Miss A Call Guarantee will be available early next month with the carrier's high-end Megacom 800 service, 800 service provided under Tariff 12 custom network arrangements, and toll-free service under AT&T's UniPlan inbound/outbound 800-services plan.

Traynor said the guarantee will be extended later this year to cover users of its mid-range Basic 800 service as well as users of the carrier's low-end Readyline 800 service.

The three options are priced from $520 to $550 a month. AT&T will install options free of charge through Nov. 15. AT&T will refund the monthly charge if customers are dissatisfied with the carrier's performance.

For more information, customers can call their AT&T account representative or dial (800) 441-6622.

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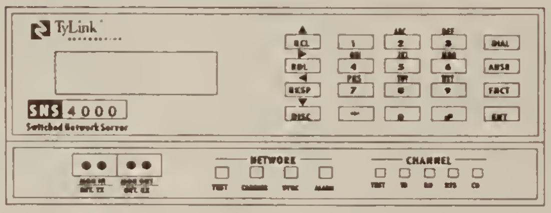

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SW Bell service provides flexibility

continued from page 21

covery features, the multiplexer passes an alarm to the workstation at the user's location. The network manager also receives notification when the circuit is brought back on-line.

TRM also has several optional features including subrate multiplexing, voice compression and frame relay, which lets users configure any circuit as a frame relay link.

With subrate multiplexing, numerous links running at speeds of 2,400 bit/sec or higher feed into one of Southwestern Bell's central offices where the Newbridge equipment multiplexes them into 64K bit/sec channels for transport over a wide-area T-1 link.

The service also supports voice and data bridging features, which can be used separately or together. They enable network managers to configure multipoint analog or digital circuits.

Voice compression

The Southwestern Bell service also includes the carrier's first voice compression feature. It enables voice to be carried on 32K bit/sec circuits instead of the usual 64K bit/sec. With the option, a single T-1 could support 44 voice calls.

"In talking to customers, we've found that voice compression is the most popular of the TRM features," King said.

TRM is available to users in Missouri and Texas. Southwestern Bell plans to tariff the offering by year end in Arkansas, Kansas and Oklahoma.

Southwestern Bell said a typical customer might pay $1,650 per month plus $45 a month for each T-1 link connected and $12 for each 64K bit/sec link connected to the TRM service.

The onetime installation charge is $303 for each T-1 and $61 for each 64K bit/sec circuit

The optional features cost the following: $132 a month for subrate multiplexing, $96 for voice compression, $133 for voice and data bridging, and $215 for frame relay. Each carries a onetime installation charge.

TRM is being sold under one-, three- and five-year contracts.

Carrier Watch

continued from page 21

can support newly enhanced and custom calling features, such as remote feature activation and enhanced voice mail services.

The GTE Mobilnet California territory includes 11 Northern California and two central coast counties.

Ameritech and Hughes Network Systems last week announced plans for the deployment and customer trial of a Cellular Digital Packet Data (CDPD) network in Chicago this year, with service based on the technology scheduled for the first half of 1994.

CDPD is a common specification that delineates how data is transmitted over cellular networks.

It was developed a year ago by Ameritech, representatives from the six other regional Bell holding companies, McCaw Cellular Communications, Inc. and GTE Mobile Services, Inc.

The Ameritech cellular packet data network will provide a number of applications including electronic mail, dispatch and database inquiry, broadcast of data to all receivers in a cell and broadcast of data to a number of receivers in various locations simultaneously.

International carriers from Argentina, Brazil and Uruguay last week awarded AT&T Network Systems a contract for a transmission system that will be used to create the first undersea fiber cable linking the three South American countries.

The fiber system will comprise a primary pair of strands as well as a backup strand and will initially operate at 560M bit/sec. It will stretch 1,714 km and link Las Tolian, Argentina, with Florianopolis, Brazil, and Moldanado, Uruguay. The system will become operational next year.

Wall Data to extend Rumba connectivity

continued from page 13

ba gateway," he explained. "Now it's all designed, sold and supported through one company."

Rumba Gateway System 2.1 is also expected to include enhanced TCP/IP support, offering 64 clients as many as four host sessions each, for a total of 256 sessions, up from 64 in previous versions.

"Comparatively, the Rumba Gateway System can support 150 [Novell, Inc.] NetWare users and 256 NETBIOS users," Veneski said.

In addition, Version 2.1 of the gateway now supports dual Synchronous Data Link Control links, providing users with access to two hosts through one gateway.

Rumba Gateway System 2.1 will be available next month for $1,495.

Wall Data's new Rumba Tools for PowerBuilder provides application developers with a Windows-based package for managing, accessing and analyzing data on an IBM mainframe, AS/400 or RISC System/6000, or on a Digital Equipment Corp. VAX through a Windows-based PC on a local-area network.

The new software automates the connection between Powersoft Corp.'s PowerBuilder and Rumba. This enables developers to run an LU 6.2 host session while working with PowerBuilder, letting them access host screens and data without forcing them to exit PowerBuilder.

"Wall Data is the only connectivity software company that integrates Advanced Program-to-Program Communications and host connectivity with PowerBuilder," said John Wall, executive vice president and founder of Wall Data.

"We see this as a viable solution for companies who wish to leverage their existing resources and migrate to client/server computing," he said.

Rumba Tools for PowerBuilder's license fee is $195. The software will be available by midyear.

Wall Data: (206) 883-4777.

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*Does not apply to Satellite category due to insufficient response.

Connectivity options added to hub line

continued from page 17

drop the price of the 3612T to $1,595.

Like all other members of the 3600 family, the new hubs can be used as standalone devices or mounted in the eight-slot AT-36C8 chassis. As many as eight 3600 hubs can reside in the chassis and act as a single repeater, only requiring one management agent to handle all of the hubs.

Because each hub carries its own independent power supply, the user also achieves a degree of redundancy so if one hub fails, the remaining hubs in the chassis can continue to function as usual.

The new 3600 hubs can be managed by any SNMP-based net management system, an ASCII terminal attached to an asynchronous port provided on each hub or via a Telnet terminal session.

Since each hub also supports flash erasable programmable read-only memory, software upgrades can be downloaded from a central location and configuration information can be maintained in the event of a power failure. ◻

Wellfleet wins router performance crown

continued from page 17

to aggregate the input of a large number of LANs, he said.

Another key consideration is connectivity options — how well the router supports multiple types of LANs, such as Ethernet, token ring and Fiber Distributed Data Interface — as well as its ability to accommodate disparate protocols, including Systems Network Architecture.

Users should also examine the scalability and manageability of the router.

Once those features are considered, raw performance becomes the next key criteria. But users should be aware that the numbers themselves can be tricky.

For example, while Wellfleet's BCN forwards 30,000 more 64-byte Ethernet packets in a second than the Cisco 7000 does, the two are on par when forwarding larger packet sizes. The BCN forwards 8,119 packet/sec when sending 1,518K-byte packets, while the 7000 forwards 8,082 packet/sec.

Larger packet sizes are typically used for such applications as file transfer and electronic mail, while small packets sizes typically contain interactive terminal traffic or acknowledgment data. ◻

Link Notes

continued from page 17

frame relay switches, users building large wide-area nets can concentrate multiple remote sites into a single regional site.

In addition to joint sales and marketing, the two companies will codevelop interoperable net management capabilities, traffic congestion control techniques and support for frame relay with Boundary Routing.

Management applications will also be jointly developed for third-party net management platforms, enabling users to manage both the router and switch net from a single management station.

Tekelec, Inc. last week announced an internet analyzer that merges the capabilities of its existing Chameleon 600 and Chameleon 1800-X analyzers into a single device.

The Chameleon Open is a local-area network/wide-area network protocol analyzer that monitors traffic across Switched Multimegabit Data Service's Subscriber Network Interface layer at speeds up to 45M bit/sec, just as the 600 model does. Like the 1800-X, it will also decode most LAN protocols, as well as additional WAN services.

The product is available now and costs between $22,000 and $45,000, depending upon configuration. For more information, contact Tekelec at (818) 880-5656.

Network General Corp. last week announced that it is shipping both the Expert Sniffer Internetwork Analyzer (SIA) and the Distributed Sniffer System (DSS) with Expert Analysis.

SIA supports real-time monitoring of both router-based internetworks using leased-line, frame relay or X.25 circuits up to T-1 speeds, as well as traditional terminal-to-host nets such as asynchronous and Systems Network Architecture. The SIA costs $18,500.

The DSS with Expert Analysis is a client/server analysis system that automatically identifies problems on Ethernet and token-ring local-area networks. A typical DSS configuration consists of SniffMaster Consoles priced at $4,995 (DOS or Unix), and Sniffer Servers with monitoring and Expert Analysis that range from $7,495 to $8,495. Monitoring-only servers start at $3,500.

For more information, call (415) 473-2000. ◻

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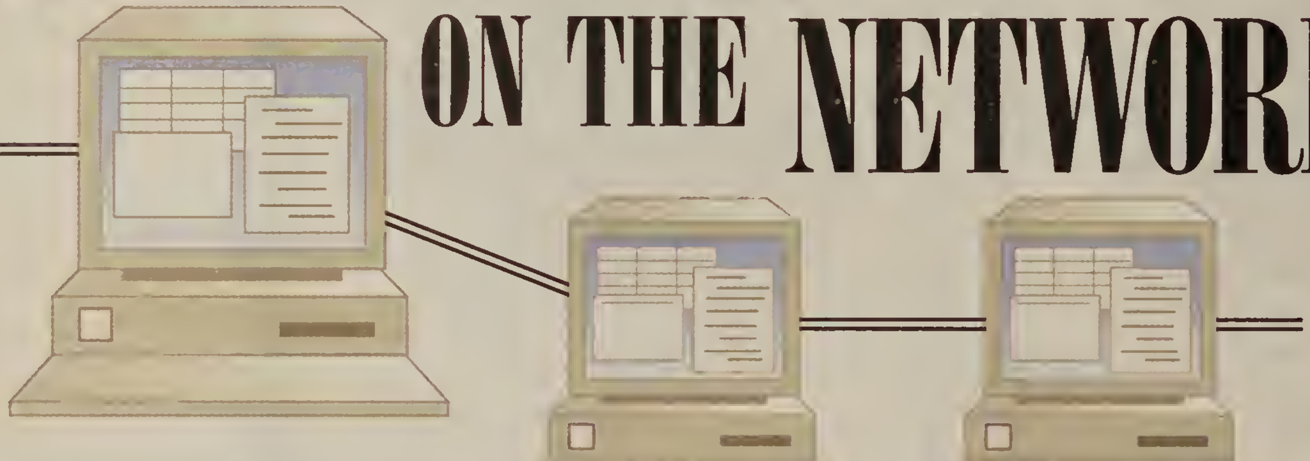

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6/4/93	Orlando, FL	Omni Orlando

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ENTERPRISE APPLICATIONS

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Worth Noting

> "The majority of people just aren't ready to implement distributed object computing."
>
> **John Rymer**
> Editor in chief
> "Distributed Computing Monitor"
> Patricia Seybold Group, Inc.
> Boston

Store & Forward

Cedalion Systems, Inc. of Charlotte, N.C., has released a tool kit of reusable objects for Powersoft Corp.'s PowerBuilder application development tool and a 100-page set of guidelines for building applications with PowerBuilder. The tool kit contains source code for more than 25 reusable objects and functions. The tool kit and guidelines cost $1,995 for the initial development server and $995 for each additional development server.

Futurus Corp. of Atlanta last week announced a local-area network facsimile server that can be used with the firm's Futurus Team groupware product. Futurus Team Fax enables users to send and receive faxes from within any Windows or Futurus Team application. The server costs $795 for a 25-user pack and $1,495 for an unlimited user edition, with an introductory discount.

Objects, Inc. of Danvers, Mass., has unveiled Layout Version 3.0, its object-oriented application programming tool for DOS machines. The new version provides an improved user interface with resizable and movable windows, plus an object tool bar. It also offers net support, multilevel indexing, query-by-example searches, and record and file locking. It costs $299.95 and is available now. ◘

Notework ships NetWare E-mail pack for the masses

Supports up to 100 file servers, 50,000 users.

By Wayne Eckerson
Senior Editor

BROOKLINE, Mass. — Billing its software as E-mail for the masses, Notework Corp. this week will unveil Version 2.0 of its Notework Electronic Mail package that supports as many as 100 Novell, Inc. file servers and 50,000 end users.

Notework 2.0 is a terminate-and-stay-resident (TSR) E-mail program for Novell NetWare local-area nets that requires 5K of conventional memory on end-user, DOS- or Microsoft Corp. Windows-based workstations.

Because the product is simple to use and easy to install and maintain, it has quietly gained a sizable market presence since its debut in 1990. There are now more than 250,000 Notework users in 27 countries.

"We attribute our successes so far to the fact that we are providing E-mail for the mass market instead of E-mail for the technically rich and powerful," said John Rizzi, vice president of sales at the firm, based here.

Because Notework 2.0 is tightly integrated with NetWare, it does not require organizations to install dedicated E-mail servers or post offices. This saves on set-up and installation time, as well as supports almost instantaneous messaging across NetWare nets.

In addition, the Notework address book is created and updated directly from the NetWare bindery, or directory. This makes it easy for administrators to set up Notework address books and keep them synchronized across multiple NetWare LANs. Most E-mail packages require administrators to set up separate E-mail directories.

In response to customers that were bumping up against the 14-file server limit of the initial version of Notework, the company rearchitected the product to support a maximum of 100 NetWare file servers and 50,000 users.

To ease name searches on large implementations, Notework has streamlined its addressing. The new version allows users to keep a private address book in addition to the wide-area address book, which contains the names of all users on the enterprise LAN.

(continued on page 29)

Micro Focus launches set of tools for client/server

By Bob Brown
Senior Editor

PALO ALTO, Calif. — COBOL software vendor Micro Focus, Inc. last week rolled out new versions of two development tools designed to help users build client/server applications.

Micro Focus introduced Version 2.0 of its Application-to-Application Interface (AAI), a middleware package for building distributed programs, and Dialog System Version 2.2, a graphical user interface (GUI) design tool.

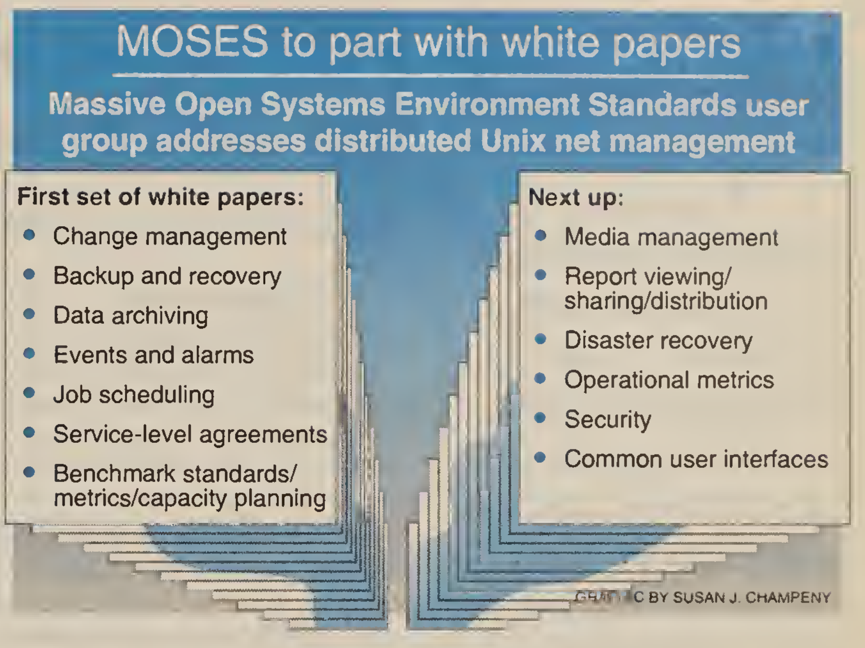
The announcements fit into a product road map Micro Focus plans to lay out at a user meeting next month that calls for the company to deliver a consistent set of tools enabling users to migrate from host-based applications to distributed environments.

New products not only include the sophisticated AAI and Dialog System products, but also basic "frontware" products for screen scraping and other functions, said Peter Katz, vice president of marketing at Micro Focus.

The company's AAI software provides the glue between multiple components of distributed applications residing on disperse platforms. AAI allows applications to communicate through remote procedure calls, asynchronous message passing and message queue processing. It obviates the need for programmers to build communications functions into applications.

AAI is based on technology from Creative Systems Interface, Inc., a Framingham, Mass., software developer that licensed to Micro Focus exclusive marketing rights to the product. AAI software runs on both client and serv-

(continued on page 29)



MOSES to part with white papers

Massive Open Systems Environment Standards user group addresses distributed Unix net management

First set of white papers:
- Change management
- Backup and recovery
- Data archiving
- Events and alarms
- Job scheduling
- Service-level agreements
- Benchmark standards/metrics/capacity planning

Next up:
- Media management
- Report viewing/sharing/distribution
- Disaster recovery
- Operational metrics
- Security
- Common user interfaces

GRAPHIC BY SUSAN J. CHAMPENY

Group preps paper on distributed systems

MOSES user group to release white papers that focus on ways to manage distributed Unix nets.

By Bob Brown
Senior Editor

BURLINGTON, N.J. — MOSES, a user group formed a year ago, has completed a set of white papers on requirements for managing distributed Unix networks, which it plans to begin disseminating to users and software developers in the weeks ahead.

Massive Open Systems Environment Standards (MOSES) is a user group designed "to tell the world about the requirements of people running large, distributed, mission-critical networks," said Michael Prince, a founder of MOSES and director of information services at Burlington Coat Factory Warehouse Corp. here.

Besides Burlington Coat Factory, members of MOSES are systems administrators from BT, Millipore Corp., Oracle Corp., Sequent Computer Systems, Inc. and US West NewVector Group, Inc. While they all use Oracle databases and Sequent processors, the MOSES members have written their papers for a broader audience.

The intent is to help users make product evaluations and buying decisions, while giving vendors guidance in addressing the needs of large network users.

The first set of papers addresses change management, backup and recovery, data archiving, events and alarms, job scheduling, service-level agreements and benchmark standards/metrics/capacity planning.

"The white papers describe what is needed in each of these areas," Prince said. "They should serve as a decent checklist for vendors building solutions for users and for users evaluating software." Burlington Coat Factory has been using a draft of the change management white paper to put in place some change management operations, he said.

Overall, the papers address the lack of a standard way to manage distributed systems, Prince said. Hardware, applications and networks have evolved to the point where users are building distributed processing nets but the management capabilities have lagged, he said.

Future releases

The next set of white papers, planned for release in the fall, will target media management, report viewing/sharing/distribution, disaster recovery, operational metrics, security and common user interfaces.

There are no plans at this time to grow MOSES beyond its existing membership, and Prince said the group could disband once it tackles all the issues it has targeted for white papers.

To request a copy of any of the first set of white papers, send an electronic mail message to Oracle's special interest group organization at udc_sig@us.oracle.com. The papers, which should be ready for dissemination in the next few weeks, will either be free or sold for a nominal fee to cover the cost of printing. ◘

INDUSTRY UPDATE

VENDOR STRATEGIES, MARKET TRENDS, ALLIANCES AND FINANCIALS

Worth Noting

"Choosing a [digital high-definition television] standard of maximum interoperability [with computers] could, in the not too distant future, ensure that every television set has the ability to interact with intelligent machines."

Rep. Edward Markey
(D-Mass.)

People & Positions

Cheryl Tritt, currently chief of the Federal Communications Commission Common Carrier Bureau, last week resigned from her post to become a partner in the Washington, D.C. law firm of **Morrison & Foerster** as of June 1. Tritt was the first woman to head the bureau.

Kathy Anderson, formerly vice president of marketing and sales support at AT&T Network Systems, Inc.'s network cable systems unit, has been named vice president of the newly created visual and multimedia communications unit within **AT&T Network Systems.**

Anderson, who will help local carriers supply broadband video and multimedia services, will also coordinate multimedia product development for all business units.

Ray Bayer, formerly product manager for Central Point Software, Inc., has joined **Cheyenne Software, Inc.** as director of product management. Bayer will be responsible for marketing the Roslyn, N.Y.-based firm's

(continued on page 29)

DOD lab to offer testing for GOSIP interoperability

SPAG technology to be used in product testing.

By Ellen Messmer
Senior Correspondent

FT. HUACHUCA, Ariz. — The Department of Defense's Joint Interoperability Test Center (JITC) this summer will launch a service to test Government Open Systems Interconnection Profile (GOSIP) products for interoperability.

The JITC laboratory will establish a price structure for testing products' interoperability with at least two other products conforming to the 1984 X.400 Message Handling System (MHS) and File Transfer, Access and Management (FTAM) standards. JITC will maintain a record of approved products that federal agencies can reference in future requests for proposal.

JITC reviews vendor product conformance tests on behalf of the National Institute of Standards and Technology (NIST).

The tests will be based on technology acquired from the Standards Promotion and Application Group (SPAG), the Brussels, Belgium-based consortium of computer vendors.

Included in that group are Digital Equipment Corp., Hewlett-Packard Co., IBM, ICL Computers, Ltd. and Siemens Nixdorf InformationsSysteme AG.

As SPAG later this year expands its repertoire of testing software modules to include 1988 X.400, network management and X.500, JITC will add those to its service lineup, as well.

Patrice d'Oultremont, managing director at SPAG, said stringent interoperability testing alleviates the burden on the user. Today, users are often forced to tinker with OSI products in order to overcome the implementation differences of each vendor.

JITC recently became the first organization to be approved and licensed to perform the SPAG testing, called Performance to Support Interoperability (PSI).

However, Dave Garrett, open systems manager for JITC, said the lab does not expect to award SPAG's PSI Mark, the brand that requires vendors to fix interoperability problems at their own expense if they arise after the product is purchased by a customer.

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INDUSTRY BRIEFS

SynOptics scores a record. SynOptics Communications, Inc. reported record revenues of $152.7 million for the first fiscal quarter ended April 2, up 17% compared to the previous quarter and 123% for the corresponding quarter in 1992. The Santa Clara, Calif.-based hub maker's earnings were $21.9 million for the quarter, up 334% from last year.

Artisoft down. Tucson, Ariz.-based Artisoft, Inc. reported revenues of $19.1 million for the third quarter of fiscal 1993 ended March 31, compared with $20.3 million for the same quarter the previous year. The vendor of peer-to-peer local-area network products reported earnings of $330,000, down from $3.6 million for the same quarter last year.

VMX acquires LAN technology. VMX, a San Jose, Calif., provider of voice processing software, has purchased the technology of The Vmail Company, Ltd., a London-based firm specializing in local-area network software, in order to expand the VMX product line for use in client/server environments. The Vmail software will be modified to operate with the VMX Integrated Voice Processing platform.

US West revenues up 4.1%. US West, Inc. reported first-quarter 1993 revenues of $2.6 billion, up 4.1% compared to the

(continued on page 29)

"With the NACS, customers will be able to get both on-line and local support for just about any problem they'll have with any product."

▲▲▲

Richard King
Vice president of services
Novell, Inc.

Novell passes service, support to resellers

Plan intended to move service, support expertise closer to end user through high-end resellers.

By Caryn Gillooly
Senior Editor

PROVO, Utah — Novell, Inc. is planning to move service and support closer to the end user with the creation of a new class of technical reseller that is expected to bear the brunt of customer service and support.

Sources said the firm will announce next month the creation of Novell Authorized Service Centers (NASC), souped-up Platinum and Gold resellers that will have at least three Certified NetWare Engineers (CNE) on staff.

Novell is hoping the CNEs will be able to offer customers the type of technical support they cannot currently get from resellers. "Today, if an end user calls our [support] hot line, we direct them to their local reseller," said Richard King, vice president of services at Novell, based here. But "many resellers are not qualified to support end users."

As much as 90% of the calls Novell receives on its support hot line are from resellers.

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As a result, today's resellers tend to be middlemen. Users contact resellers, who then turn to Novell for the necessary technical information. According to King, as much as 90% of the calls Novell receives on its support hot line are from resellers.

However, users are frustrated by this middle step. "Today, the people you talk to know support but not the technical details of the products," said Ed Froste, director of management information systems at Kentucky Honey Corp. in Frankfort, Ky.

"This [NASC program] is focused on developing the middleman channel."

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King agreed that this was true. "Customers have been encouraging us to strengthen the quality of the service provided by our channel," he said.

The purpose of the new program is to avoid that extra step and move the expertise out to the resellers. "This [NASC program] is focused on developing the middleman channel," King said.

Novell has already met with its Platinum resellers and contacted its high-end Gold resellers to explain how the new system will work, according to King. Besides at least three CNEs on staff, all NASCs will be required to be technically versed in Novell's basic product line, such as NetWare and

(continued on page 29)

DOD lab to offer SPAG testing

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"If a vendor desires to be marked, they'll pursue that with SPAG," Garrett said.

Awarded the PSI Mark

A half dozen European vendors — including Bull HN Information Systems, Inc., ICL, Ing. C. Olivetti & Co., S.p.A. and Siemens — have received the PSI Mark for 1984 X.400, said d'Oultremont. Within a few weeks, the first PSI Marks for FTAM are expected to be awarded to Bull, ICL, Olivetti, Siemens and Isocor.

Garrett pointed out that the JITC testing will be oriented toward GOSIP requirements rather than the specific profiles contained in the European Procurement Handbook for Open Systems (EPHOS), the European Community initiative similar to GOSIP.

Patrice d'Oultremont, SPAG's managing director, and Glenwood Bradley, director of the joint interoperability test center, sign licensing agreement.

The EPHOS and GOSIP specifications are slightly different, although harmonization efforts are slowly aligning the two.

JITC interoperability testing will not become mandatory under GOSIP, emphasized Jean-Phillipe Favreau, GOSIP testing program manager at NIST. "NIST's position has been to let the market decide how interoperability testing should be implemented," Favreau said.

However, the Defense Department intends to make interoperability testing mandatory for a military-unique version of X.400, called the Defense Message System (DMS), which is the planned replacement for the current Automated Digital Information Network.

The Defense Department is eager to have multiple suppliers for the DMS-compliant version of X.400 when it releases the bid for that network later this summer. The critical importance the new network will have in carrying both classified and nonclassified military messages makes interoperability a top priority.

"We will definitely require interoperability testing in DMS-compliant products," emphasized Air Force Lt. Col. Phil Toler.

Notework ships E-mail pack

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Within their personal directory, users can search a person's first name, last name or work group. The Notework address book automatically scrolls to different names in the directory as the user types the letters of the E-mail recipient's name, address or work group.

The wide-area directory lets users conduct directory searches based on seven categories, including first name, last name, company, location and ad hoc categories. "The ability to access all users from a single menu using real names saves us time and cuts down on frustration," said Robin Green, network manager at Texas General Agency.

> "The ability to access all users from a single menu saves us time and cuts down on frustration."

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Version 2.0 also supports the NetWare Global Message Handling Service (MHS), which allows Notework users to exchange messages with other Notework users via dial-up lines. It also provides access to other public and private E-mail systems via MHS gateways. Notework also supports Global MHS' directory synchronization features.

Notework 2.0's new features include subject lines, carbon copy and blind carbon copy.

Notework 2.0 is available now and costs between $30 and $45 per user, depending on volume. Existing Notework customers can upgrade to Version 2.0 for $19.95 per user. The package, which supports both DOS and Windows, ships now.

Notework: (617) 734-4317

Industry Briefs

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corresponding period last year.

Earnings climbed 6.7% for the period to $316.1 million.

In addition, the company noted that its number of cellular subscribers reached 435,000, which is an increase of 33% since March 1992.

RadioMail raises cash. RadioMail Corp., the Menlo Park, Calif., provider of wireless electronic mail and information services, said the company has received $3 million in private funding from Motorola, Inc. of Schaumburg, Ill., and 2M Invest, which is based in Denmark.

RadioMail said it plans to expand its marketing beyond the U.S.

Peregrine buys vendor. Peregrine Systems, Inc., the Carlsbad, Calif.-based supplier of help desk and network management software, has acquired Network Edge, Inc., a software vendor located in Colorado Springs, for an undisclosed amount.

Network Edge specializes in software to manage Novell, Inc. NetWare local-area networks from Hewlett-Packard Co.'s OpenView platform.

Sprinting to new record. Sprint Corp. reported revenue of $2.7 billion for the quarter ended March 31, up 9% from the $2.5 billion posted for the same quarter last year.

Unisys revenue off. Unisys Corp., the Blue Bell, Pa.-based computer system vendor, reported revenue of $1.91 billion for the first quarter ended March 31, compared to $2.01 billion for the same quarter last year.

Chipcom posts record. Chipcom Corp., the Southborough, Mass.-based maker of hubs and other network products, reported record revenue of $30.6 million for the first quarter ending in March, which was up 85% from the $16.5 million recorded for the corresponding quarter last year.

TRW and Tellabs sign pact. TRW High-Performace Network Products, the Torrance, Calif., division of TRW, Inc., has signed a technology development agreement with Tellabs Operations, Inc. in order to determine how to apply Tellabs' Synchronous Optical Network-based TITAN 5500 digital cross-connect system interface to TRW's Broadband Access Switch 2010C Asynchronous Transfer Mode switch.

Micro Focus launches tools

continued from page 27

er devices supporting a distributed application.

The new version supports added protocols — including Novell, Inc.'s Internetwork Packet Exchange (IPX) and Named Pipes — on the server, as well as the Transmission Control Protocol/Internet Protocol and the Network Basic I/O System. Previously, it supported Named Pipes on the client, plus LU 6.2, TCP/IP on AIX and Multi Region Operation/Cross Memory Services.

At the platform level, AAI runs on Microsoft Corp. Windows, OS/2 and IBM's AIX, and will run on The Santa Cruz Operation, Inc.'s SCO Unix by the end of the second quarter. Micro Focus is targeting SunSoft's Solaris, Hewlett-Packard Co. HP-UX and various Unix platforms going forward.

AAI works with applications built using Micro Focus COBOL as well as a variety of programming languages from other vendors.

Dialog System Version 2.2 lets programmers build graphical front ends for client/server applications. The new version adds support for the Open Software Foundation, Inc.'s Motif to the product's existing support for Windows, OS/2 Presentation Manager and DOS.

AAI Version 2.0 is priced according to the platform, ranging from about $100 for some clients to as much as $70,000 for mainframe servers. Dialog System Version 2.2 costs $1,250 per copy, with a $250 annual maintenance fee. The upgrade to Version 2.2 is free for existing Dialog System users with a maintenance contract.

> Dialog System Version 2.2 lets programmers build graphical front ends.

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Both products are available now.

People & Positions

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communications, storage and security products.

Mark Perry, currently a board member and vice chairman of Silicon Graphics, Inc., has been appointed to the board of directors of **Arbor Software Corp.**, the Santa Clara, Calif.-based maker of eSSbase Data Analysis Server, a client/server application for financial data analysis.

Carol Cayo, formerly senior legislative assistant for domestic policy under Rep. Gary Ackerman (D-N.Y.), has been named director of congressional relations for the **Information Technology Association of America**, the trade organization for vendors of computer and communications products.

Michael Fleisher, formerly a consultant with Boston-based Bain & Co., has been appointed director of stategic planning for **Gartner Group, Inc.**, an information technology research firm based in Stamford, Conn.

Fleisher will be responsible for identifying growth areas and aquisition possibilities in information technology.

Ronald LeMay, president and chief operating officer of **Sprint Corp.**'s long-distance division, has been elected to Sprint's board of directors, bringing the total number of board members to 17.

Novell passes on to resellers

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the primary clients found in NetWare nets, including DOS and Microsoft Corp. Windows.

Novell will also create an online database to track NASCs that have expertise in particular products, such as Novell's NetWare for SAA. Users will then be able to access the database to find the closest service center specializing in a specific product.

The NASCs seem to solve many of the problems users have finding the technical expertise needed to answer questions. "I've heard about the NASCs, and I think it's a good move," Froste said. "It will let us get into Novell's on-line [database], then provide a CNE for phone consultations."

King agreed that the new system will be more efficient. "The NASC program is becoming the service leg of the reseller program," he said. "We are not a geographically dispersed company, so with the NASCs around the world, customers will be able to get both on-line and local support for just about any problem they'll have with any product."

A disk problem causes you incredible discomfort. A lapse in memory takes its toll on your entire system. It wasn't anyone's fault. But now it's yours. Because if it affects the LAN, you're the one who has to deal with it.

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PS/2 Server 195

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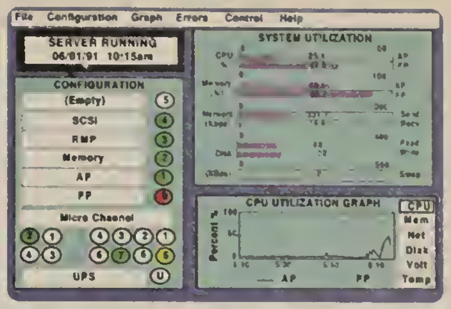
With the Maximum Availability and Support System/2 (MASS/2) option, the Server 195 provides comprehensive local and remote server monitoring, control, tuning

---

*Available from IBM, M-F, 8 A.M. to 5 P.M. in your time zone. **For information regarding the terms of IBM's money-back guarantee and limited warranty, please call 1 800 772-2227. Copies of IBM's money-back guarantee and statement of limited warranty are available upon request. IBM, Micro Channel, PS/2 and OS/2 are registered trademarks and HelpWare and HelpCenter are trademarks of International Business Machines Corporation. Novell and NetWare are registered trademarks of Novell, Inc. ©1993 IBM Corp.

It even tolerates

and recovery capabilities. MASS/2 works with a battery backed-up Remote Maintenance Processor (RMP) option that can notify you of errors, failures, corrective action taken—even provide system access during a power failure. And you can extend fault tolerance to the entire disk subsystem by adding an Orthogonal RAID-5 Disk Array/2.



The MASS/2 option has a user-friendly GUI that lets you distribute computing power across your organization from a central location.

Server 195/295 Comparison

Feature	Server 195	Server 295 Model 1	Server 295 Model 2
Remote Maintenance Processing and Modem	optional	standard	standard
Processors	486/50 MHz	MP-486/33 & 50 MHz	MP-2 486/50 MHz
Available Slots	8 Micro Channel®	12 Micro Channel	12 Micro Channel
MASS/2	optional	standard	standard

Like all PS/2s, the Server 195 is backed by IBM HelpWare™—a range of service and support so complete, it's hard to find fault with. You get a three-year on-site warranty with four-hour average response time*, around-the-clock set-up, usage and service assistance on IBM hardware and software during warranty,** a 30-day money-back guarantee** and more. For more information or an IBM certified dealer near you, call our Personal Systems HelpCenter™ at **1 800 772-2227** or TDD ASCII **1 800 426-4238.** In Canada, call **1 800 465-7999.** The new PS/2 Server 195 is so reliable, why would you tolerate anything less?

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PTT

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MANAGEMENT STRATEGIES

MANAGING PEOPLE AND TECHNOLOGY: USER GROUPS AND ASSOCIATIONS

Worth Noting

"It's frustrating that the PC networking industry as a whole ignores networking with mid-range systems. It makes it hard on the mid-range user."

Raymond Mueller
President
Management Information
Support, Inc.
Lakewood, Colo.

Manager Minutes

Skill Dynamics, an IBM company, has announced the addition of 25 new courses to its security, audit and disaster recovery curriculum.

The company will also sponsor three security-related conferences this year: PC/LAN Security Conference, July 27-29 in Chicago; Enterprise-Wide Security Conference, Sept. 13-15 in Washington, D.C.; and Disaster Recovery Symposium, Dec. 6-8 in San Francisco.

For further information or a course catalog, call (800) 426-8322.

Digital Equipment Corp. has announced several electronic data interchange developments, including support for the X.435 protocol in its EDI software, allowing users to integrate DEC EDI document handling capabilities with their corporate X.400 messaging backbones.

DEC also certified five third-party EDI applications, including financial, manufacturing and logistics/distribution packages, to operate in a DEC EDI network. And DEC/EDI users can now connect their EDI networks to those of Chrysler Corp., Ford Motor Co., General Motors Corp. and K-Mart Corp.

"[The Internet] is an endlessly expanding frontier, infinitely transforming itself and constantly generating new, interesting types of applications."

▲ ▲ ▲

Vinton Cerf
- ☐ Internet Society president
- ☐ Vice president of the Corporation for National Research Initiatives

BT unit takes the wraps off latest EDI offerings

Options debut at EDI '93 Conference & Exhibit.

By Bob Brown
Senior Editor

SAN ANTONIO, Texas — BT North America, Inc. announced a handful of new access options for its electronic data interchange network at the Data Interchange Standards Association, Inc.'s recent EDI '93 Conference & Exhibit here.

The annual EDI conference, which attracted more than 1,200 attendees, served as a forum for discussion about the latest trends in EDI and an opportunity for vendors to display new EDI products and services.

BT North America's new EDINet access options include X.400, facsimile, IBM Systems Network Architecture and Odette File Transfer Protocol. EDINet is a value-added service that rides on BT North America's Global Network Service packet switching network.

The new EDINet access options are designed to enable users to communicate with EDI trading partners regardless of the trading partners' network setup, according to Martha Hanlon, director of application services product management for BT North America. Previously, EDINet offered access only via asynchronous, bisynchronous and X.25 links, she said.

The X.400 access will enable users to consolidate their links into BT North America's network by sending both electronic mail and EDI over the same link, Hanlon said.

It will also enable users to send EDI in an event-driven manner, in which the data will be delivered directly to a recipient's computer, rather than the traditional store-and-forward method, which requires the recipient to dial up a mailbox, she said.

BT North America will make its X.400 access offering available by June and plans to support X.435 — a standard that provides EDI-specific message addressing for the X.400 envelope — by 1994.

> The new fax option will enable EDI users to communicate with even their smallest trading partners by sending EDI data to a fax machine.
>
> ▲▲▲

The new fax option will enable EDI users to communicate with even their smallest trading partners by sending EDI data to a fax machine rather than a computer. This option will also be available in June.

The SNA access allows for communications between SNA and non-SNA shops, as well as between SNA users, via Synchronous Data Link Control. It will be available in November.

Odette access, which is available immediately, is based on the secure European communications standard that picks up a file transfer transmission even after it is interrupted and continues the transmission.

THE FUTURE OF THE INTERNET

BY DAVID FERRIS

Gaining perspective on the nascent Internet

Last month in my column, we discussed the Internet — a motley collection of autonomous computer systems that connect and share resources at will. It is still a niche technology, used mostly by computer-literate types, but things are changing. In 20 years, the Internet will likely be as ubiquitous as the telephone is today.

In an attempt to flesh out some of the more important developments we'll see, I interviewed two Internet gurus: Vinton Cerf and Steve Wolff.

Cerf is a coinventor of the Transmission Control Protocol/Internet Protocol suite, on which the Internet is based. He is also president of the Internet Society and vice president of the Corporation for National Research Initiatives. For Internet folks, he is the holy of holies.

Wolff is director of the Networking Division of the National Science Foundation, one of the original sponsoring organizations of the Internet. He wields a big financial, technical and intellectual stick, and commands commensurate respect.

Endlessly expanding

According to Cerf, the Internet provides a way for groups of people spread throughout the world to hook up and share their interests and knowledge. Nothing like this has been possible before, he noted.

"It's an endlessly expanding frontier, infinitely transforming itself and constantly generating new, interesting types of applications," Cerf said.

Today's wide access to specialized data, programs and bulletin boards — all of which are mostly used by technical users — is just the beginning. Wolff said use of those items is doubling every year, with commercial organizations making up the fastest growing segment.

Lively interest groups dealing with such issues as medieval history, physics, biology, linguistics and Shakespeare are flourishing on the Internet. The city of Wellington, New Zealand, has even put its press releases and hotel and restaurant guides on-line. Indeed, the Internet's appeal will become very broad.

As I explained last month, Commercial Internet Carriers (CIC), such as Performance Systems International, Inc.'s PSInet and UUNET Technologies, Inc.'s Alternet, have taken root. They let you access Internet services and provide a way of connecting a company's in-house computers. In short, CICs can run your wide-area networks for you.

That should prove extremely attractive. In addition, CICs will experience brutal competition because much of what they provide is a commodity. The underlying data communications lines, routers and skills that are required to run a TCP/IP network are now easier to come by and will result in low prices and high service levels.

By the year 2,000, few organizations will have much to gain by running their own WAN.

Technical infrastructure

Three important technical details must be addressed in order to fuel Internet growth.

The first is addressing. Addresses can only be 32 bits long, which leaves about four billion addresses for all the computers on the Internet. This might seem like a lot, but the numbering is done in a clustered manner, just like telephone numbers. New numbers are in very short supply.

In addition, several addressing projects are under way, with names like CIDER, SIP and TUBA, but it's too early to say which solution will be chosen.

Second are bandwidth requirements. Today, a 56K bit/sec line is usually sufficient for Internet connectivity. In fact, many people get by OK with 2,400 bit/sec links. However, demands are about to increase drastically, spurred by such applications as

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OPINIONS

HIGH-SPEED NETWORKING

BY RALPH DORMITZER

FDDI as high-speed LAN service deserves closer look

There is no single correct answer to building high-speed networks. Users deploy new and existing technologies based on need, cost, performance, availability, standardization and future benefits. But one existing technology that deserves a closer look for use in corporate nets is Fiber Distributed Data Interface.

FDDI is a 100M bit/sec token-passing network technology that uses optical fiber as its transmission medium. It is currently available with multimode fiber for distances up to 1.2 miles, or 2,000 meters, and in single-mode fiber for as long as 25 miles, or 40,000 meters. This year, an unshielded twisted-pair copper version will be standardized for use at 100 meters.

FDDI products are based on industry standards, enabling users to buy FDDI products with confidence that they will interoperate. FDDI products are widely available, with more than 80 companies providing such offerings.

To date, FDDI has found widespread acceptance in backbone and server applications, as well as in high-speed workstations where net demand has exceeded the available Ethernet or token-ring bandwidth. Today, the technology supports multimedia traffic, including data, video and voice.

FDDI costs are moderate today and are declining rapidly. Competition among vendors and chip development will continue this trend. Copper-based versions will lower costs even further.

In the future, FDDI will coexist with two emerging technologies: Asynchronous Transfer Mode (ATM) and 100M bit/sec (Fast) Ethernet. ATM provides advantages, such as variable bit rate, low latency and guaranteed delivery. Above all, ATM promises simplification of data networking by unifying local- and wide-area protocols, as well as by providing bandwidth on demand. However, it is neither a standard nor widely available today.

In addition, for the next few years, ATM will be somewhat expensive, more so than FDDI, and suitable only for a small number of users.

FDDI is also being positioned by some in the industry against Fast Ethernet, a data link technology that is not needed because it is unlikely to offer cost advantages over FDDI. Moreover, Fast Ethernet cannot provide the distance options of FDDI, will require users to install new interface cards, bridges and routers, and will have limited use in applications that can tolerate its transmission distance and bandwidth. Complicating matters even further, there is no agreement on a standard implementation of Fast Ethernet.

That makes FDDI the logical choice for today and well through the decade.

FDDI has 10 times the bandwidth of any other available technology and can handle almost any of the exciting new applications: image transmission, multimedia and videoconferencing. For high-performance servers and congested backbones, it is the practical choice today. ◘

Dormitzer is group manager of network interconnect products at Digital Equipment Corp. He can be reached via the Internet at dormitzer@emds.enet.dec.com.

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The Newsweekly of User Networking Strategies

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EDITORIAL

Putting the Reader Advocacy Force to work for you

It's been nearly a year since *Network World* established the Reader Advocacy Force (R.A.F.), and in that time we've tackled major issues affecting buyers of network products and services. We've got a long list of topics planned for 1993 coverage, but we need your input to ensure we're addressing the most important issues users are facing.

The R.A.F. serves as an ombudsman for readers in spotlighting problems that complicate the job of building multivendor networks.

Among other things, we've examined the state of router interoperability, pressed for changes in service and support, called for a national plan for mutual aid among carriers and encouraged local-area network makers to improve interoperability and provide better support for the growing legion of mobile workers.

Beyond the big picture issues, one of the most rewarding aspects of the R.A.F. has been helping individual readers deal with sticky situations.

For example, we uncovered one reader's problem using frame relay service with a particular type of equipment and one company's concern about the lack of an upgrade path for its databases.

We also brought to light problems with a major carrier's pricing and a user's difficulties integrating one vendor's Unix into the Systems Network Architecture world.

This is where you come in. *Network World* is the only network publication with an active reader advocacy program. But in order to serve as your advocates, we need to hear from you about the problems you're facing.

To that end, we've established a variety of mechanisms to help you get in touch with us. You can leave a message on the R.A.F. Hotline at (800) 622-1108, Ext. 487; the R.A.F. Forum on our electronic bulletin board system (see page 5 for instructions); or the Internet at nwraf@world.std.com. You can also call any of our reporters at (800) 622-1108.

The R.A.F. illustrates our commitment to users. Use it for all it's worth. ◘

MANAGEMENT MATTERS

BY MARY JOHNSTON TURNER

Automation is key to effective net management

Network management systems and tools are now going beyond simply telling net managers how the network is doing and moving toward automating the responses to those status reports. By automating network management functions, net managers can free staff from many mundane tasks and enable them to focus on mission-critical priorities.

Some areas where your staff might benefit from automating routine tasks include:

■ **Fault management filters and rule-based responses.** These features allow network operators to easily set and alter the points at which alarms are forwarded to the operator for action. They also allow the operators to associate all related alarms under one report so the network management platform, not the network operator, must sort through alarms in order to figure out what is important.

In addition, network operators can write their own rules instructing the management tools on how to respond to selected types of alarms — for example, instructing the management tool to launch a diagnostic routine to inspect interface port performance whenever selected types of alarms are reported.

■ **Trouble-ticket automation.** Trouble tickets are the formal records identifying a problem, assigning responsibility for its diagnosis and tracking all actions taken to resolve it. Rules-based fault management systems that detect network events such as traps and alarms can be configured to filter these events, logically associate them with one another and automatically assign all related events to one trouble ticket.

As a result, the net operator only has to respond to a problem once, rather than manually scan and analyze multiple problems linked to the same cause.

■ **Knowledge templates and scripts.** Tools to help network operators categorize and analyze past problems and build templates for how to respond to them are becoming available. Network operators can use these systems to turn more responsibility over to the help desk staff, freeing engineers and analysts to concentrate on more difficult problems and new requirements.

Net managers should invest in tools that rely on robust relational database technologies.

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■ **Performance trend analysis.** Most top management systems and applications include the ability to track service-level metrics. These could include mean time to close a trouble ticket for the trouble management system; network availability and utilization for the performance monitor; and numbers of unauthorized network access attempts from a security application. By storing and reviewing this data over time, trends will appear that signal how well the staff is meeting its performance goals.

■ **Empower users.** One way to reduce the load on network operators is to get users to do more for themselves. Give them access to the same trouble management system your staff uses. Then they can open their own trouble tickets on-line and access the system to check the status of a complaint. Some companies have even developed systems that allow users to call an automated attendant and use the telephone push-button pad to trigger terminal resets or low-level network tests.

Automation is the key to proactive network management, rather than simply responding to problems as they occur. At the heart of such a system is accurate, accessible information. Network managers should be investing in network management tools that rely on robust relational database technologies. Managers must also put in place procedures to ensure that data about the network is entered in a timely and accurate manner.

Network managers who use third-party assistance in managing distributed networks should apply the same rules to vendors. Select companies that can demonstrate extensive and mature use of automation and have a plan to take things even further as technologies evolve.

Whether investing in management tools, making decisions about staff or selecting outside help, the keys to managing networks efficiently are having good data and automating as much of the management processes as possible. Net managers can't afford to get less than maximum output from their staff and net management resources. ◼

Turner is a principal with Northeast Consulting Resources, Inc. She provides strategic and technical planning to end users and vendors in the areas of internetworking, global services, network management and outsourcing. She can be reached at (617) 570-0790 or via MCI Mail at 384-0973.

TELETOONS

BY FRANK AND TROISE

Yes... our network is safe from hackers, viruses, thieves and ... um... there was a fourth thing..

LETTERS

Northern Telecom cleared

I'm very pleased to report that the Federal Communications Commission has ruled that allegations that Northern Telecom, Inc. failed to comply with terms of its experimental radio license (*NW*, March 15, p.5) are unfounded.

Accordingly, the FCC has granted Northern Telecom permission, as of April 1, to continue its experimental wireless trials as originally authorized. We appreciate the FCC's responsiveness in clearing up this misunderstanding.

Northern Telecom views these trials as important learning experiences, both for us and for our customers. We have more than 40 such trials under way, with plans to expand that to as many as 100 trials by midyear. Feedback thus far has been favorable, both in terms of utility and performance.

Joseph Baker
Assistant vice president
of marketing
PCS Wireless Systems
Northern Telecom, Inc.
Richardson, Texas

Galaxy left out

We were dismayed that Galaxy Networks, Inc. was left out of your Buyer's Guide on modems (*NW*, April 19, p.44). Although Galaxy Networks is known primarily for its local- and wide-area networking solutions, we have many unique modem products.

For example, we are the only manufacturer that provides a complete dial-up solution to connect desktop, laptop or notebook computers directly to an IBM mainframe, Application System/400 minicomputer, asynchronous personal computer or facsimile machine through our Systems Network Architecture modem. And we are the only manufacturer that provides a complete dial-up so-

(continued on page 46)

Want to respond to an article or opinion in Network World? *Mail typed letters to Editor,* Network World, *161 Worcester Road, Framingham, Mass. 01701, or fax them to (508) 820-3467. Transmit your response via MCI Mail at 390-4868 or to our Bulletin Board System. (See page 5 for BBS instructions.) Letters may be edited for space and clarity.*

HELP IS ON THE WAY! If you have a question regarding a product, service or technical problem, submit it to our Network Help Desk. We'll contact vendors, network integrators, consultants and other experts to get an answer for you.

You may submit questions to Susan Collins, associate features editor, by calling (800) 622-1108, via fax at (508) 820-3467, via MCI Mail at 390-4868 or via *Network World*'s bulletin board (see logon instructions, page 5).

Preparing for the multimedia mix

By JEFF UBOIS

The idea behind multimedia seems simple enough: Make networked computers handle sound, image and video as well as they handle numbers and text.

But turning this idea into reality is a complex task, one that has many net managers scratching their heads and wondering how to keep multimedia from straining every computer and network component to the utmost.

Indeed, stirring sound, image and video into the network mix will likely require more disk storage, more powerful processors, faster networks and advanced software — not all of which are available yet and most of which are costly. The alphabet soup of new, competing networking and data format standards only adds to the confusion.

Many net managers find that dealing with rapidly changing multimedia application and equipment requirements poses a far greater challenge.

"That is probably your biggest problem when you talk about upgrading a net to handle multimedia; applications are coming out so fast, it's really difficult to forecast what you are going to need," says Dave Palmer, a partner at Integrated Strategic Information Service (ISIS), a San Francisco-based market research firm.

Network managers willing to tackle these problems will find that preparing networks for multimedia depends primarily on the applications they plan to deploy.

Some applications, particularly interactive full-motion video, pose immense technical challenges that have yet to be met. Other applications, such as annotating voice to electronic mail messages, are available now.

Faster, faster

Network managers looking to implement applications that support high-quality, full-motion video will likely need to bump up network bandwidth or look for ways to lessen the amount of bandwidth that video chews up.

Even with compression, VHS-quality video requires about 1.2M bit/sec of bandwidth. Advanced digital video could use 30M to 130M bit/sec.

In addition, networks optimized for carrying packet data, such as Ethernet, do a poor job of carrying packetized full-motion video, which requires delivery of packets in a particular order and with small, consistent delays.

Very fast networks that provide the additional bandwidth needed to support multimedia are now emerging. Many of them are extensions to Ethernet or Fiber Distributed Data Interface standards that run over existing cable plant but may require users to swap out network interface boards.

In addition to faster transport speeds, vendors are developing isochronous protocols that promise to deliver the continuous data streams generated by voice and video with little delay. These isochronous protocols establish a virtual channel on local-area networks that behaves similarly to a dedicated point-to-point circuit between devices.

There is also work under way to develop packet-switched protocols to support transmission of full-motion video over LANs.

For example, researchers at the Kansas City Center for Telecomputing Research at the University of Missouri, Cornell University and the University of North Carolina are working on ways to deliver full-motion video over existing packet-based networks, according to Tom Nolle, president of CIMI Corp., a Voorhees, N.J.-based consulting firm.

"The whole area of packet video is critical for multimedia because without some form of packet video transport, the impact of video on a LAN would be extremely large," Nolle says. "The core issue is preservation of the existing infrastructure. Users can't afford to change it out, they've got too much money invested in it."

For those who can afford to swap out LAN infrastructures, one of the most promising new network architectures is Asynchronous Transfer Mode (ATM), a fast packet switching technology that allows the creation of virtual channels that can support isochronous-like connections. ATM can theoretically operate at speeds of up to 622G bit/sec, and the technology is being extended to support even higher speeds.

ATM will probably find its first application in multimedia networking as a backbone network and eventually find its way to the desktop as prices drop.

Users looking to adopt ATM will likely need to buy new network adapters at anywhere from $1,300 to $2,500 a pop and switches at $2,000 to $2,500 a port. ATM has the backing of virtually every major computer vendor, but it may take until 1996 before practical commercial products are widely available.

An ATM alternative is 100M bit/sec Ethernet, and there are a number of proposals before the IEEE 802.3 committee to create a standard for this technology.

ILLUSTRATIONS ©1993 CYNDY PATRICK

While the goal of Fast Ethernet is clear — an easy and inexpensive way to migrate existing Ethernets to higher speeds — there are some uncertainties. For instance, it's not apparent how well 100M bit/sec will support multimedia, particularly when it remains unclear if the standard will call for isochronous support.

A few 100M bit/sec Ethernet products are available now.

MicroAccess, Inc. of San Jose, Calif., has been shipping adapters since last year and recently added hubs and repeaters.

In general, 100M bit/sec Ethernet products are expected to cost 1½ to two times the price of existing Ethernet products. But realistically, net manag-

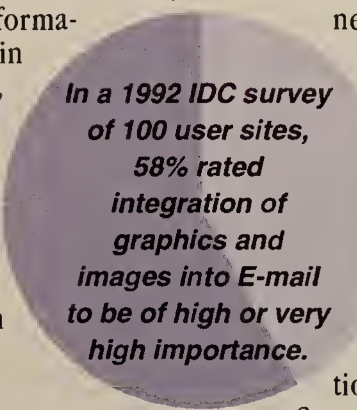
Network transport and application deployment issues await those ready to cook up multimedia applications.

ers need to wait and see on this one, especially since the IEEE is expected to take until next year to settle on a standard.

An isochronous Ethernet technology called isoENET has been developed by IBM and National Semiconductor Corp.

IsoENET runs over existing 10base-T cabling and can coexist with standard Ethernet. It adds a 6.144M bit/sec isochronous channel on top of the 10base-T channel. This isochronous channel may be divided into 96 64K bit/sec Integrated Services Digital Network B channels that can support voice or video transmissions between devices.

IsoENET was recently approved as an IEEE 802.9 standard. Products and pricing information are scheduled to be available in the first half of next year (*NW*, March 29, p.18). IsoENET requires workstations that use the isochronous protocol to be equipped with new network adapters and attach to new hub ports. However, machines that do not use the isochronous service can retain existing equipment.


In a 1992 IDC survey of 100 user sites, 58% rated integration of graphics and images into E-mail to be of high or very high importance.

New FDDI options

Upgrades to FDDI are also worth considering.

FDDI over twisted pair, for instance, is an affordable way to bring 100M bit/sec to the desktop because it enables FDDI to run over existing cabling. It is suitable for multimedia in terms of speed and adapters are available from many vendors for between $1,000 and $3,000, FDDI over twisted pair does not provide isochronous services.

FDDI-II does support isochronous services. With FDDI-II, users can slice 100M bit/sec of bandwidth into as many as 16 6.144M bit/sec isochronous channels, which can be further subdivided into 64K bit/sec ISDN B channels that behave as circuit-switched instead of packet-switched channels.

Unfortunately, FDDI-II is not directly compatible with FDDI, so net managers must retrofit existing FDDI stations with FDDI-II equipment or install a second network. At least one firm, ALFA, Inc. of Hyannis, Mass., will later this year roll out FDDI-II products that will be priced comparably with existing FDDI products.

Synchronous FDDI is another option, one that is already part of the ANSI X3T9.5 FDDI standard. Synchronous FDDI is well adapted to carrying full-motion video because traffic isn't subject to packet delays, and, at 100M bit/sec, it has sufficient bandwidth to handle simultaneous voice conversations.

Earlier this year, ALFA unveiled synchronous FDDI network adapters priced from $1,000 to $1,800 and concentrators including an eight-port version ranging from $5,000 to $7,500. These support multimode fiber, shielded and unshielded twisted pair, and dual- and single-attached stations. ALFA says its products can be added to standard FDDI networks without interrupting service for existing users.

Another fiber-based option is the Fiber Channel Standard (FCS), an ANSI X3T9.3 standard for serial data transfer with rates ranging from 120M to 1G bit/sec over distances of up to 10 km. FCS is backed by Hewlett-Packard Co., IBM and Sun Microsystems, Inc., all of which plan to offer FCS adapters to enable their workstations to establish point-to-point links or connect through a switch, most likely of the ATM variety.

Reducing bandwidth needs

For many network managers, finding ways to reduce bandwidth requirements or ways to improve use of existing bandwidth is a more realistic approach than forking over reams of cash for a new network.

One here-now, ready-to-go strategy for providing more bandwidth is to use intelligent or switching hubs to break networks into small segments, a process known as microsegmenting. Placing fewer nodes on each segment increases the amount of bandwidth available to each user. These segments are connected to a hub or switch that provides connections between them.

Microsegmenting can be taken to the extreme by attaching workstations directly to a port on a switching hub in a star configuration. This enables users to establish point-to-point connections through the switching hub at the LAN's full speed.

Several companies, including Alantec in San Jose, Fibronics International, Inc. in Hyannis, Kalpana, Inc. in San Jose, LANNET Data Communications, Inc. in Huntington Beach, Calif., and SynOptics Communications, Inc. in Santa Clara, Calif., are offering switching hubs that enable microsegmenting.

"Switched Ethernet is a very practical way of increasing available bandwidth because you can dedicate the whole Ethernet link to a single workstation," says Lawrence Gasman, publisher of the "Multimedia Networking Newsletter" in Washington, D.C.

Another approach to trimming bandwidth needs is to use local storage to decrease the amount of traffic between clients and servers. For example, rather than having one copy of an image database on one server, multiple copies can be distributed around the network. Users can then access the database closest to them.

Taken to the extreme, the database could be stored on each workstation. But that can have drawbacks.

"It depends on how often the information changes and how many users you have," says John Gale, president of the Information Workstation Group in Alexandria, Va. "If you have only a few users, local storage can be good, but if you want to have data accessible to 100 people, then a multiple gigabyte disk farm replicated 100 times gets real expensive."

Traffic control

An even simpler way to reduce bandwidth demand is to limit the traffic that multimedia applications generate, and vendors are offering products that meet this goal. For example, multimedia conferencing products use compression in conjunction with reduced picture resolution, smaller picture windows and slower video frame rates to reduce the traffic they generate.

Advances in compression technology will further reduce bandwidth requirements. Think of it this way: A tenfold improvement in compression technology can stave off the need for a tenfold increase in network speed.

Compression techniques for full-motion video have been improving steadily over the past decade. The Motion Picture Experts Group (MPEG), for example, is working on a system for entertainment-quality video on compact disc that offers compression ratios of up to 200-to-1 (see graphic, page 46).

"What makes for advances in compression is not just increases in processing power, but intellectual leaps as people come up with new ways of removing redundancies within single images and between frames," Gasman says.

For example, he notes that Iterated Systems, Inc. of Norcross, Ga., is promising compression ratios of up to 2,456-to-1 using fractals, a technique for representing complex images as mathematical functions that can be performed by receivers to reconstruct the image.

Clever data management techniques can also reduce LAN traffic. For example, Seattle-based Aldus Corp.'s Fetch multimedia database ships small, low-resolution sketches from the server to the client. Users then scan the sketches and request the full, higher resolution images of only the ones they want.

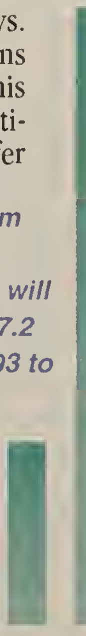
Today's reality

Network managers contemplating using relatively simple multimedia applications have it even easier.

"People need to realize that you don't have to run out and put in FDDI and huge storage capacities on the assumption you will be moving massive amounts of data," ISIS' Palmer says. "There are a lot of alternative solutions coming out that allow you to do a lot of this stuff with plain old Ethernet, and, realistically, vendors are going to have to offer something you can integrate into existing networks."

For example, George Yundt, executive vice president of The Machaira Group a Chicago-based brokerage firm, is using Artisoft, Inc.'s Sounding Board, a $99 personal computer add-on board with a tele-

(cont. on page 38)


Revenue from multimedia applications will grow from $7.2 billion in 1993 to $24.3 billion in 1998, according to Frost & Sullivan Market Intelligence.

(continued from page 37)

phone-like handset and speaker jacks.

The Sounding Board enables 10 users on the brokerage's 10M bit/sec Artisoft LANtastic LAN to annotate voice messages to E-mail and items within files that use Microsoft Corp.'s Windows Dynamic Data Exchange or Object Linking and Embedding. For example, a cell in a spreadsheet or a paragraph in a letter can have a voice comment attached to it.

To add voice comments, users click on a Windows application's Insert Object option, hit the space bar and start talking. When finished, they hit the space bar again, and the message is automatically attached to the file. Users receiving files with attached comments double-click on a small icon to hear the message.

The firm uses conventional E-mail to exchange messages about routine transactions, Yundt says.

"But voice annotation is better for complex problems." For example, voice is better at conveying emotional subtleties. "If there is a problem, I can leave a message that says, 'Could you call the clearing firm NOW, PLEASE!' more easily than with text."

> Some users have decided that running high-quality digital video over their nets is impractical for now.

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Although the company has a voice mail system to handle after-hours customer calls, it uses the Sounding Board for internal voice messages during the day. Yundt said he is looking at using the Sounding Board to deliver up-to-the-minute bulletins from recorded information services. A secretary can call the service, record the message and pass it around the network.

Damn the digital

Other users have decided that running high-quality digital video over their nets is just silly, or at least impractical for now. Instead, they're opting for analog video and sticking with the kind of gigabit networking technology already in use — cable television.

The Bank of America National Trust & Savings Association, for example, keeps six top executives up-to-date on current events by delivering CNN to their desktops over existing token-ring cabling.

"It's a really inexpensive way to bring video to the desktop because there's no need to upgrade the network," says Rich Siglin, consulting systems engineer at the Bank of America in Concord, Calif.

Siglin is using an $895 product called Super VideoWindows from New Media Graphics Corp. of Billerica, Mass., to display the video feed on the executives' PCS and an $80 IBM physical adapter called an F-Coupler to get the video signal on and off the token-ring cabling.

Eventually, Siglin says, executives may be able to view video tapes and video disks from their desks and use the token-ring network to control the video players.

Software issues

Aside from resolving transmission issues, users must decide how to deploy multimedia software, such as by adding software to support multimedia on clients.

Apple Computer, Inc., Microsoft, Sun and others are working to provide multimedia extensions for their client operating systems and various graphical user interfaces (GUI) that make client software selection easier.

"If you have a personal computer environment with a Windows GUI that supports a high-resolution display, it is easy to adapt that to present multimedia data, so there is not a cost to upgrade the computer to run your multimedia application," CIMI's Nolle says.

Perhaps this is why most network managers consider server-based software selection more problematic. Multimedia places special demands on servers not just for speed and storage, but for processing and network management.

Many vendors are currently introducing video server software. Existing video servers store video clips, handle data compression and decompression, and format video signals so they can be transported over IEEE 802 networks such as Ethernet and token ring.

In the future, video servers will also handle analog-to-digital conversions as well as provide gateways to other video networks such as cable television, phone company services and videoconferencing

Secrets of the

Secret #3:

Network Metamorphosis

Once there was a kingdom spanned by a vast network. The King, a wise man, was always looking for ways to improve the network, and one day he issued a proclamation:

BE IT KNOWN that the royal network, while adequate for the needs of the Farmers and the Kitchen Staff, is not sufficient for other needs. To wit:

The Knights in the field wish high-speed circuit switching for intelligence gathering and war games.

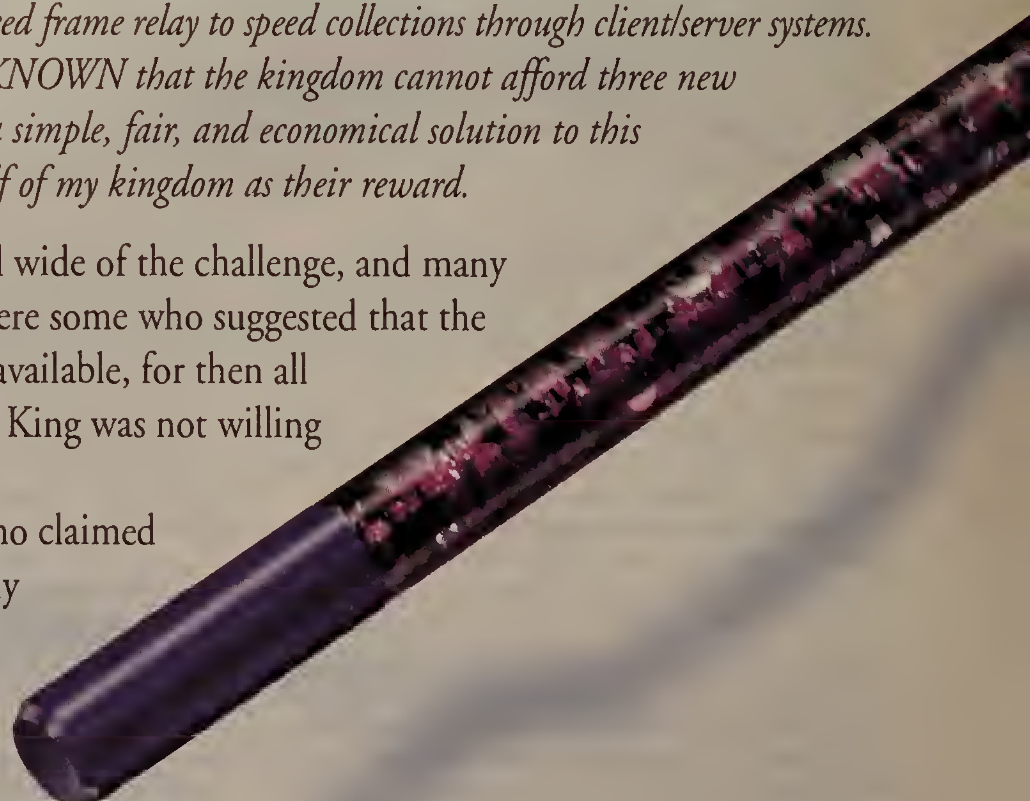
The Royal Ambassadors want X.25 to communicate with other countries.

The Tax Collectors need frame relay to speed collections through client/server systems.

BE IT FURTHER KNOWN that the kingdom cannot afford three new networks. Anyone with a simple, fair, and economical solution to this problem shall receive half of my kingdom as their reward.

Word spread far and wide of the challenge, and many answered the call. There were some who suggested that the King wait until ATM was available, for then all would be satisfied. But the King was not willing to wait.

There were those who claimed that the King sought a Holy Grail, for such a wish was



Become a Wizard of I.T. and transform your network with magical eas

services. They will also act to manage and control multipoint videoconferences.

By managing the delivery of video to clients capable of supporting multimedia applications, these servers make up for some of the deficiencies in today's transport protocols and network operating systems.

While several large computer vendors are touting machines with vast amounts of disk storage and fast processors as servers for multimedia applications — IBM is pushing its ES/9000 mainframe as an ideal multimedia box, for example — three smaller companies are at the leading edge of the video server market.

All three are well adapted for handling video training, video mail and database applications for departmental LANs and are designed to allow developers to build multimedia support into client applications.

ProtoComm Corp. of Trevose, Pa., is offering a Novell, Inc. NetWare Loadable Module (NLM) called VideoComm that lets NetWare clients play back audio and video files stored on a NetWare server. VideoComm, in effect, provides isochronous-like services on NetWare LANs and works with clients that support Microsoft's Video for Windows, Apple's QuickTime and all types of video compression.

VideoComm includes its own video network protocol that runs over NetWare and drivers for client software. Prices range from $3,800 to $7,800.

Mark Everding, president of Dataseek, Inc. in Houston, has developed a video database system using ProtoComm's NLM for a dating service called Great Expectations, a nationwide franchise headquartered in Encino, Calif. The system enables

(continued on page 46)

The bleeding edge: medicine and multimedia

Mixing medical images with patient records on the same workstation promises to offer great rewards, but it is one of the toughest challenges in multimedia networking.

The University of California at Los Angeles Medical Center is meeting that challenge head-on. The Medical Center has installed a Picture Archiving and Communications System (PACS) to handle images gathered from X rays, magnetic resonance image (MRI) and computer tomography (CT)scans.

PACS consists of four high-resolution and three medium-resolution workstations capable of retrieving X rays, MRIs and CT images, as well as patient records. "We are using a three-tiered network," says Dr. Ricky Taira of the Medical Center's Department of Radiological Science. "From the CT and MRI equipment to the central file server, we have an FDDI ring, and then distributed from the server to the workstations, we have a 1G bit/sec [Ultra Network Technologies, Inc.] UltraNet."

PACS workstations are linked to the patient records system via Ethernet, he adds.

The storage requirements are enormous: Each X ray or MRI creates an 8M-byte file, while CT scans create 30M-byte files. The Medical Center handles more than 250 X rays, 50 MRIs and 50 CT scans every day, which generate over 3G bytes of information.

"Radiology is going to be one of the most difficult fields to automate and computerize because of the large amounts of information we require," Taira says.

In order to handle the load, the Medical Center is currently using two Eastman Kodak Co. EDL-6800 storage devices, each of which provides 1T byte of storage. Compression technology has been left out of the loop thus far because of worries that compressing and decompressing a medical image will reduce its quality, which could lead to a misdiagnosis. But Taira says several compression schemes that do not reduce quality are now being evaluated.

Another issue is cataloging and directory services. A directory of all images is stored in a Sybase, Inc. database on a Sun Microsystems, Inc. server.

Integrating PACS with the Medical Center's other systems presented special challenges. For instance, the Medical Center had to develop a high-level menu interface that enables users to specify what data they want.

"[Users] don't know where the data lives or how to get to it," Taira says. Instead, they ready a request for data that is passed to the Sun server, which breaks it apart and parcels it off to the system that can satisfy that request.

— Jeff Ubois

Wizards of I.T.

impossible. But the King was not willing to believe this.

And there were those who told him to simply install multiple networks, one for each application. It would be expensive, but surely taxes could be raised... But the King was not willing to do that.

At last, a man came before the King and presented him with a wand.

"Your Majesty, I too had similar problems until a Wizard of I.T. showed me the solution. Now, I wish to pass my expertise on to you. Netrix allows you to transform your network with magical ease, from frame relay to X.25 to circuit switching and back again, as easily as you can wave this wand."

"Astonishing!" cried the King, holding the wand gingerly. "And this wand can do all this?"

"Just between us Wizards, Your Majesty, the wand is mostly for show. But the powers you will wield are quite real. Not only can you reconfigure your network at will, but you can see the results of your actions instantly, and then change things again if they do not suit you. And a single architecture supports all these protocols, even ATM, in time."

"Excellent!" said the King. "You have answered my challenge and more. Half of my kingdom is yours, as I have promised."

And so the King learned to transform his network more easily than changing a frog into a prince, and he provided each user with the proper technology. And everyone lived happily ever after.

Outside the United States call 01-703-793-1225.

*Call Netrix at **1-800-WIZARDS (949-2737).***

NETRIX™

NETWORK WORLD TEST ALLIANCE

Novell redefines NOS security with NetWare 4.0

By MARK GIBBS

New version of popular NOS sports many improvements in security and data integrity, but a few holes remain.

For any network manager setting eyes on NetWare 4.0, Novell, Inc.'s latest network operating system (NOS), one point should become clear instantly: Novell has vastly improved the software's security and data integrity services.

With NetWare 4.0, Novell has implemented a diverse set of security services that provides users with the tools necessary to ensure data and network integrity on an enterprisewide scope.

The new services include NetWare Directory Services (NDS), auditing, file compression, file migration and NetWare Loadable Module (NLM) integrity. Novell also enhanced NetWare's authentication services, including the addition of a packet "signature."

NDS completely changes the way the network is logically organized and managed. NDS' enterprisewide view of the internetwork makes it easier to control security.

Auditing, a service originally intended for inclusion in NetWare 3.1, is finally available in NetWare 4.0 and will let network managers closely track net usage in a centralized, coordinated fashion.

File compression and file migration are completely new technologies for NetWare, although they may come with a performance penalty to users. And file migration can adversely affect system reliability.

NetWare 4.0's newly distributed backup service — the Storage Management Services (SMS) — offers a comprehensive backup service, despite a limited range of backup systems supported.

Still, despite the gaps, Novell appears to have delivered a capable set of security services.

NetWare Directory Services

Because NDS permeates every operation under NetWare 4.0, it is the NOS' most important new feature. NDS is a database containing information about all network elements — users, servers, printers and print queues.

Users and network resources, such as applications, can access the directory service to locate other users or network services. Previously, the functions that NDS now performs on an enterprise scope were handled by NetWare binderies, which provided a directory of work group elements attached to a single NetWare server.

One limitation of that approach, though, is that information on other network servers is limited to little more than network addresses. By contrast, NDS acts as a global network directory service, providing a view of all the network resources across the enterprise, along with their associated properties.

With NetWare 3.X, each server is effectively isolated from other servers, which, in a multiserver network, means that resource management has to be handled on a server-by-server basis. The opportunities for making mistakes — by allocating rights that are too liberal, for instance — are much greater when multiple, isolated systems are being managed.

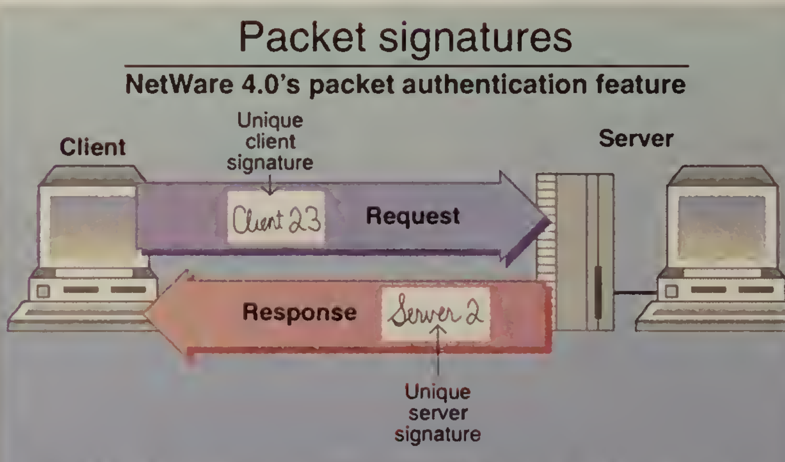
In a multiserver NetWare 3.11 environment, users could employ add-on products such as Novell's NetWare Naming Service or Banyan Systems, Inc.'s Enterprise Network Services to provide a broader view of server directories. These products integrate the management of bindery data across multiple servers. But while these add-ons go a long way toward enabling enterprisewide server management, they provide a much more limited range of directory integration than NetWare 4.0.

Partitions

The NDS database is divided into partitions to improve integrity and performance. Each partition represents a section of the enterprise directory that describes all of the resources in that portion of the network.

The master copy of a partition is kept on a single server, while other copies are stored on other servers as backups. This setup also improves directory lookup time, particularly if the directory partition is local, as opposed to having to conduct the lookup over a wide-area link.

NDS simplifies the task of maintaining user accounts. With previous versions of NetWare, network supervisors had to maintain several independent accounts for users that needed access to more than one server on an internetwork. With NDS, however, the network supervisor has to define only one account per user and that account defines one set of enterprisewide access rights for the user.



NetWare 4.0 attaches unique, randomly generated signature to each packet generated by a workstation or server. This prevents hackers from capturing packets and forging a user's session identification to gain access privileges.

GRAPHIC BY SUSAN SLATER SOURCE: GIBBS & CO., VENTURA, CALIF.

Also, it introduces redundancy into the net. If a server should suffer a catastrophe, the data in the NDS partitions that were replicated keep the NDS data on-line and, therefore, recoverable. According to Novell, any user that loses a partition and doesn't have a replica will completely lose access to that section of NDS data. Restoring from a backup will fix this problem but, in a large internetwork, the process of restoral could take considerable time.

New rights for NDS

NetWare 4.0 builds on NDS by offering improved support for access control, allowing a net manager to restrict usage of various network resources to authorized users.

These rights define file privileges such as read, write and delete. Likewise, NetWare 4.0 access rights allow the net manager to define the actions a user or program is allowed to perform.

As if NetWare didn't already have enough access rights, NDS introduces 10 more related to NDS objects, which are entries in the NDS database that represent such network resources as servers, users and printers. It also provides emulation of the five rights associated with the pre-4.0 bindery. The good thing about these new rights is they form a logical and workable extension to the pre-4.0 access control scheme. The downside is that there's a lot to learn and because access control is now applied on an enterprisewide basis, even more planning is required to maintain rigorous security.

Before NetWare 4.0, NetWare access rights could be divided into two areas — file and directory rights and bindery rights. NetWare 4.0 extends the concept of access rights to NDS by defining object rights (Supervisor, Browse, Create, Delete and Rename) and property rights (Supervisor, Compare, Read, Write and Add/Delete Self). Object rights control user access to network-based objects; property rights determine whether users can change object attributes.

Under NetWare 4.0, objects can have a special property called Access Control Lists that define how objects can access one another.

An auditor's tool

Another new security-related feature in NetWare 4.0 is powerful auditing capabilities.

The objective of auditing is to review the events that have occurred and confirm that the system is being used in a manner and for purposes consistent with company policy.

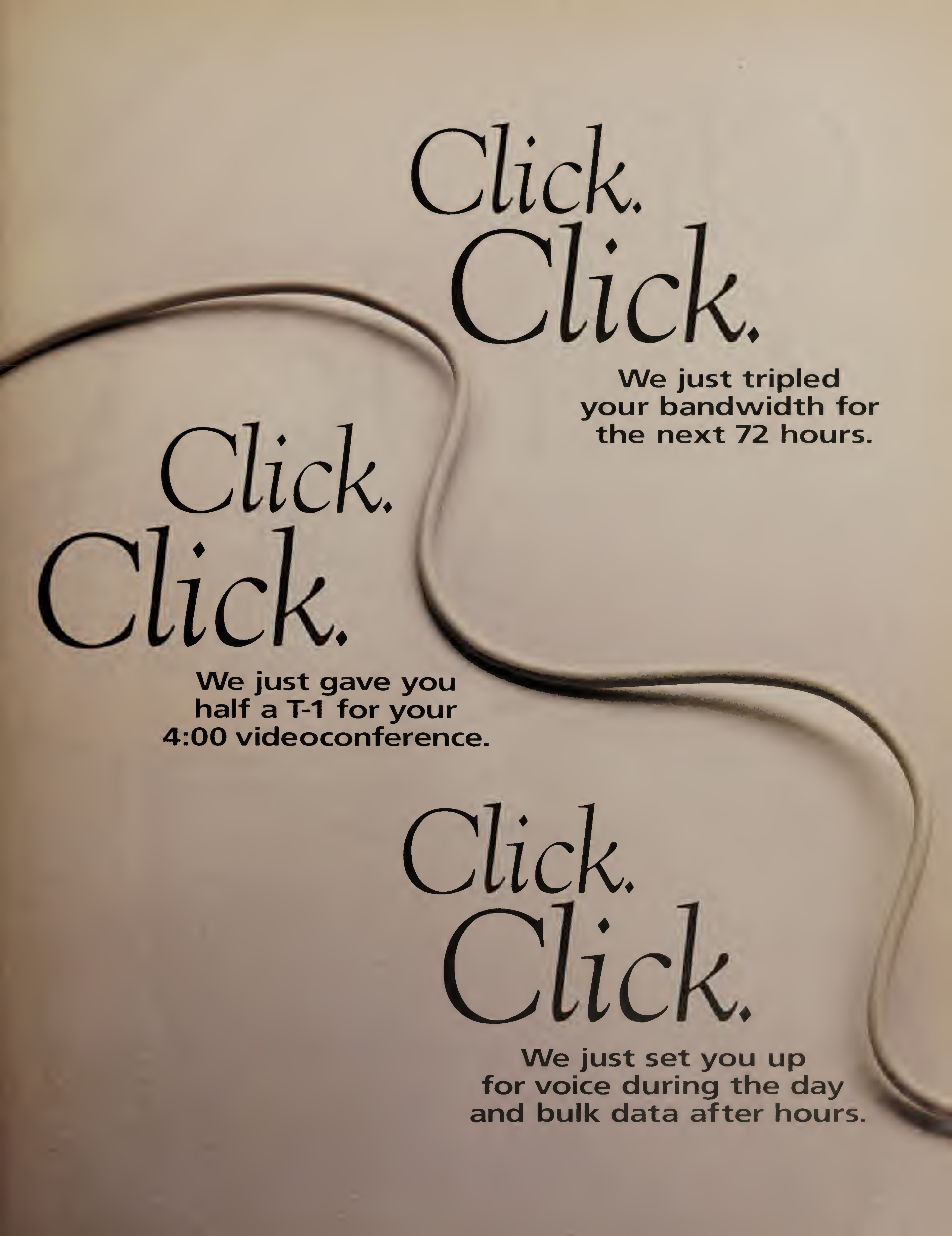
Installing NetWare 4.0 auditing is merely a matter of setting auditing functions for specific operations after NetWare 4.0 has been installed. The network supervisor enables auditing of containers — collections of network objects — and server hard-disk volumes before setting separate auditing passwords for each volume and container and handing over the passwords to the auditor. The auditor then changes the passwords so no one can interfere with the audit process and configures which events are to be examined. No one, not even the network supervisor, can access the auditing data without the auditing passwords. The supervisor can't change the passwords, either.

Auditors, meanwhile, cannot institute an audit on other volumes or containers unless they have supervisory rights. In this sense, auditors are like any other end user — they can't access services or functions unless they have the access rights.

Auditors set the size of the files used to store audit event data; in addition, they set a threshold file size. If the threshold is exceeded, a warning is sent to the server console, logged into the server's error log and, optionally, broadcast to all users on the network.

NetWare 4.0 can be configured to dismount the disk volume or just disable auditing when the file event audit file is full or an unrecoverable write error occurs. Once a volume is dismounted, us-

(continued on page 44)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(continued from page 40)

ers lose all access to the data on it. With NDS events, a full event file can be defined to disable auditing or disable the event itself.

The audit facility under NetWare 4.0 is impressive, but it has some interesting holes. First, what can the network manager do with the audit data? The events that are recorded are just a list of network occurrences that identifies who triggered them. There aren't any tools to analyze this data, which presents some interesting opportunities for third-party vendors.

Two kinds of tools are needed. The first would reduce the potentially huge volume of data into a manageable form and produce statistical analyses. The other type would provide an intelligent analysis pattern of activity and exceptions to the organization's standards for network use.

Another hole, and the most crucial one, is the matter of what happens if the auditor gets fired or can no longer be trusted. Without the auditing passwords, the auditing system can't be accessed.

If the file audit options are set to dismount the volume when the audit file is full, the net manager would need the audit file/directory password to remount the volume. Even if the volume isn't set to dismount, the net manager would still be unable to access audit data that could reveal problems and security violations.

Shrink-wrapping

In most aspects, the NetWare 4.0 file system is essentially unchanged. However, Novell has added two new services: file compression and file migration.

Compression allows the net manager to shrink files on a server hard disk to increase disk space utilization. The compression is carried out only if the file hasn't been opened for a certain number of days, as defined by the net manager.

Novell claims to have engineered the compression service to ensure file integrity so a system crash during compression won't corrupt the file. Also, a file that can only be compressed to a limited extent (a user-definable value) will be ignored.

However, compression creates two problems in connection with security systems, such as antivirus NLMs and integrity shells, that conduct checksums of files. First, whenever the security software examines files on the server, the process of reading the file contents will require each file to be decompressed. This will significantly increase the scan time required.

Also, if the security software runs every day and files on the server longer than one day are compressed, scanning will ensure that the file does not get recompressed. This will require NLM vendors that conduct this kind of operation to redesign their products if they are to work efficiently under NetWare 4.0.

Playing the jukebox

Another new service, file migration, has some interesting integrity and availability implications. Migration allows the network manager to move infrequently used files to slow-storage media, such as write once, read many times (WORM). The NOS migrates inactive files when the server's free disk space drops below a predefined level until server storage space opens up again.

The files appear to be active because the file directory entries are still visible. However, the files really exist only on the archival system, and it's only their directory entries that are left on the local directories. As soon as a migrated file is summoned, the NOS retrieves the file.

N**etWare 4.0 sports a new feature called SMS.**

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One problem with migration is that the introduction of additional storage subsystems increases the risk of data loss and problems retrieving it. In the event of a hardware failure, users would have to wait for the equipment to be repaired before they could access archived files.

The biggest risk is the need to physically control the slow-storage media. If the network manager has migrated sensitive data to an optical disk and that disk has been archived, the loss may go unnoticed for a very long time.

Storage with style

While file migration archives inactive files, NetWare 4.0 also sports an impressive new feature called SMS that also deals with data backup.

SMS is implemented as a collection of subsystems that allows a server to back up and restore itself, other servers, workstations and the NDS.

SMS' major deficiencies are that it requires huge amounts of server memory — 3M bytes more than is required by the rest of the system — supports only tape drives and does not support automated tape changers. This latter deficiency is a serious omission because backing up an NDS database that supports a large internetwork could involve a huge amount of data.

SMS can back up DOS, File Transfer, Access and Management (FTAM), Macintosh, Network File System and OS/2 files on the server, as well as DOS and OS/2 data from workstations.

In addition, it can perform different types of backup (full, differential or incremental backup) and restore data. But the most important part of SMS is its ability to back up NDS data, which can't be done by any other backup system at this time.

It's unfortunate that SMS is the only current tool for backing up NDS since SMS isn't a solution that will meet everyone's needs.

Thwarting packet pilfering

A short time ago, a university student in the Netherlands wrote a program that watched for data packets on a NetWare network traveling between a workstation and a server. The program noted the details of the packet and then forged packets to the server as if it were the other workstation. The server couldn't distinguish between real and forged packets, so the program acquired whatever rights the workstation's user had.

In NetWare 4.0, Novell has addressed this problem and produced a comprehensive solution. Under NetWare 4.0, workstations and servers using the NetWare Core Protocol (NCP) can be required to attach a "signature" to each packet sent (see graphic, page 40).

These signatures are transaction-based rather than session-based, which means that the signature changes with each packet. This prevents a forger from just trapping a packet and using the signature as if the forger was in that user's session. The file server can also be required to use NCP packet signatures so both ends of the session are validated.

Additionally, in a multiple file server network, different servers can have different packet signature levels, an arrangement that lets servers carrying more sensitive data have better protection.

This service is a definite security improvement because once a technique such as packet forgery is found, someone will try to exploit it. But while Novell has remedied packet forgery for some NetWare users, it still exists for others. That's because packet signing applies only to NCP sessions and not, for example, to Apple Computer, Inc.'s AppleTalk File Protocol (AFP).

An enterprising hacker can still forge a Macintosh user's AFP packets and access a NetWare server at whatever security level the user has.

The same problems apply to other common network protocols, such as the Transmission Control Protocol/Internet Protocol and Xerox Corp.'s Xerox Network Systems, so NetWare 4.0 packet signatures are only a partial solution.

Another problem with packets is that the data they carry is not encrypted. A protocol analyzer can capture this data in a usable form without difficulty. To address this, Novell will be introducing packet-level encryption later this year through an NLM. As with packet signatures, it will apply only to NCP; other protocols supported by the server will remain nonsecure.

NLM integrity

NOS security must extend beyond what users can do to corrupt data; network managers also have to be concerned with how applications, in the form of NLMs, can corrupt data. This is a very important issue because a poorly written NLM can easily crash a server, resulting in data loss.

Bowing to market pressure, Novell has introduced support for server memory privilege levels. This feature allows regions of server memory to be controlled to protect tasks from accessing each other's memory areas.

With NetWare 3.11, all NLMs run at what is called Ring 0, the same privilege level as NetWare itself and the least protected ring. If an NLM writes over memory that it does not own, it can crash the server.

NetWare 4.0, however, allows NLMs to run in Ring 3, the most protected ring, called the OS-Protected domain.

S**ervers can have different packet signature levels.**

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Then, if an NLM runs rampant, any attempt to use memory that it doesn't own is detected and the NLM is terminated.

This is an important feature and one that NetWare has been lacking. The only problem with this service is that it will cause a small performance loss.

New NOS is much improved

The answer to whether NetWare 4.0 is really better in security and integrity terms is a resounding yes. The fact that Novell has addressed security and data integrity so thoroughly indicates the strategic nature of those services to users.

The inclusion of a robust distributed global directory service is going to make administration of a NetWare internetwork potentially more organized, which will allow for better control and, consequently, improve integrity and security. Partition replication, which ensures directory services' integrity, makes NDS even more appealing.

The big problem is that NDS is complicated. What little simplicity existed has been wiped out and previously simple operations, such as logging on, require users and supervisors to have a much more comprehensive knowledge of how the NOS works.

Auditing is a potentially strategic service, but the lack of analysis tools and the danger of being locked out are not trivial issues. Novell should consider implementing some kind of two-part key system so the auditor problem can be solved. This would allow the administrator and another company official to supply keys that would allow the auditing system to be opened.

The new SMS is another service headed in the right direction, but until it supports a much wider range of backup devices, its appeal is limited. The fact that it is the only tool for backing up NDS is unfortunate, but third-party vendors should start adding support for NDS to their products soon.

The support for packet signatures is a first step to real on-the-wire security, but until packet-level encryption is available, network data is still exposed. The lack of equivalent support in other protocols that can be handled by a NetWare server is going to remain a problem area for the foreseeable future.

There are third-party products that address packet encryption as an add-on feature to NetWare, and for users that really care about packet-level security, they are the only solution.

For network managers working with complex internets of NetWare servers, NetWare 4.0 is definitely a strategic solution that offers some important security and reliability services. What do you lose? Just the small amount of simplicity that you might have thought you had.

Gibbs is a technology analyst with the National Computer Security Association and principal of Gibbs & Co. He can be contacted through CompuServe at 75600,1002 or Novell's nHub (mgibbs@gyre). His latest book, The Absolute Beginner's Guide to Networking, *published by Howard W. Sams & Co., will be available in May.*

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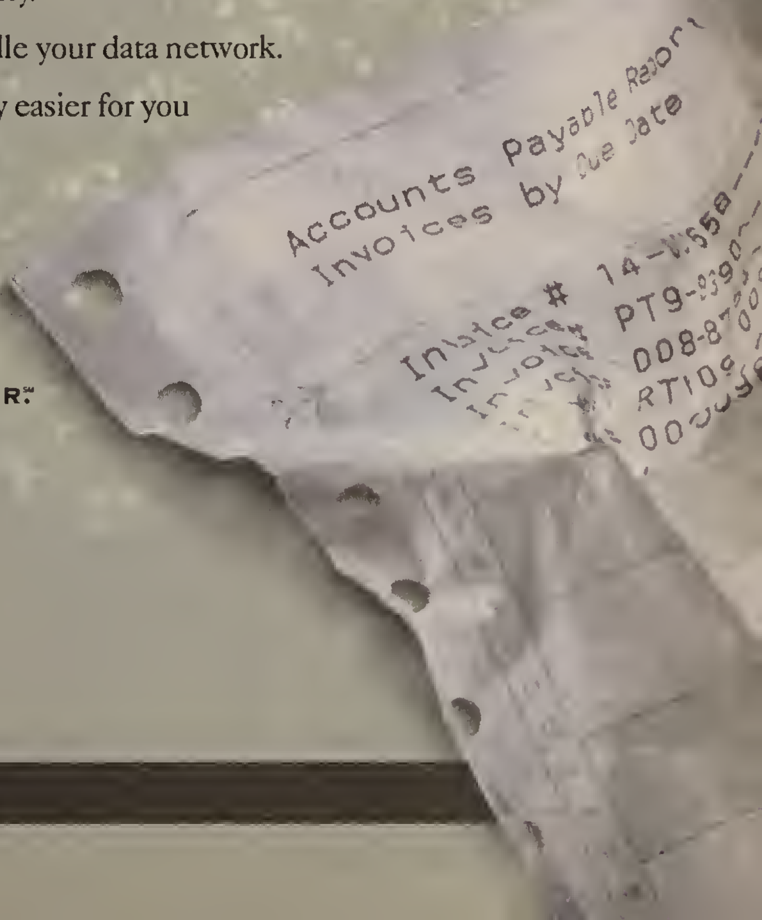

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Preparing for the multimedia

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customers to view thumbnail biographical sketches of people in the database and play back short 6M- to 10M-byte video clips.

"What we need to get is a continuous stream of video data from the server, and typically you don't get that with Novell," Everding explains.

"ProtoComm smooths the delivery of data, and the thing I like about it is it uses Ethernet and [NetWare], so it is a fairly cheap way to do it."

On the client side, Everding's system uses software he developed using Intel Corp.'s Digital Video Interactive (DVI) libraries and a driver provided by VideoComm.

Another video server NLM is offered by Fluent, Inc. of Natick, Mass. The company's FluentLinks dynamically adjusts video data rates to match available bandwidth while maintaining a clear and synchronized delivery of audio.

On the client side, Fluent's Video Producer lets users control video data rates at the time of recording. Fluent says that with its technology, a standard Ethernet segment can support four to 12 users with 12 to 30 frame/sec video.

Starlight Networks, Inc. of Mountain View, Calif., is taking a somewhat different approach. The company's StarWorks software, which runs on an Intel 80486-based PC with an Extended Industry Standard Architecture bus, supports Macintosh and PC clients using a variety of video standards including DVI, Audio Visual Interleave, QuickTime, Joint Photographic Experts Group and MPEG.

StarWorks supports up to 20 simultaneous users on AppleShare, Microsoft LAN Manager, NetWare and Sun Network File System networks. It manages the delivery of video to workstations using a proprietary protocol and also manages video files and multimedia objects.

Starlight offers StarWorks as a software-only package or on a Starlight MediaServer, a 50-MHz 80486-based PC with 3G to 6G bytes of storage that sells for $23,000 to $39,500.

These servers aren't the right solution for everyone, but they do begin to address some of the special problems posed by multimedia.

Is it worth it?

As with any other technology, multimedia's success will depend on its ability to offer cost-effective solutions to real problems. So far, that goal has been difficult to attain, especially for full-motion video.

"I haven't seen that many people who have actually done real-time multimedia in networks," says the Information Workstation Group's Gale. "This is one of those cases where there is a lot of talk but people haven't seen the justification to spend serious money. There are very few applications with financial payback."

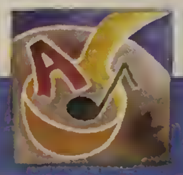
CIMI's Nolle agrees, saying power users that can benefit from full-motion video constitute only about 8% of the user population.

"Converting the entire network infrastructure to support that 8% cannot be justified," he said, especially since the cost of adding multimedia to the workstation is at least $700 for a minimal video camera and display interface, while network upgrades run from about $1,400 per user on an existing high-end network to $15,000 per user if a new network must be installed.

Even though low-cost partial solutions abound, the techtopia of full-motion, real-time desktop video seems several years away. But network managers wanting to reach that techtopia should start preparing now. ◻

Ubois is a free-lance writer based in the Washington, D.C. area.

The alphabet soup of multimedia standards



Standard	Proponent	What it does
Digital Video Interactive	Intel Corp.	Offers Real Time Video (RTV) and Production Level Video (PLV) compression at a ratio of up to 160-to-1. RTV compresses video in real time, while PLV compresses stored video. RTV and PLV offer play back rates of 30 frame/sec.
QuickTime	Apple Computer, Inc.	Enables Macintosh users to create, store, transmit and play back compressed video at rates of between 15 and 30 frame/sec. Apple is porting QuickTime to Microsoft Windows.
Video for Windows	Microsoft Corp.	Enables Windows users to create, store, transmit and play back compressed video at rates of between 15 and 30 frame/sec. Supports the Audio Visual Interleave compression standard.
MPEG	ISO's Motion Picture Experts Group	Several MPEG standards are being developed to format video clips at compression ratios from 50-to-1 up to 200-to-1. With MPEG compression hardware costing over $100,000, these standards are more likely to be used for applications such as CDROM catalogs.
JPEG	CCITT and ISO's Joint Photographic Experts Group	JPEG has its roots in still-image compression and formatting and is now addressing full-motion video. The JPEG algorithm offers relatively high resolution and uses a compression ratio between 20-to-1 and 50-to-1.
Px64	CCITT	A suite of standards for videoconferencing that includes the H.261 standard. Allows for connections between videoconferencing codecs made by different vendors using single or multiple 64K bit/sec circuits.

CCITT = Consultative Committee on International Telephony and Telegraphy

Multimedia catches on in the wide area

Once contained to local-area networks, multimedia applications are starting to spread across wide areas.

For example, Pacific Bell uses an Integrated Services Digital Network Basic Rate Interface (BRI) circuit to support an interactive multimedia training system. Users at 10 sites dial up an ISDN BRI connection to link their Sun Microsystems, Inc. workstations to a server that runs the application.

Once connected, the users get a series of still images and audio messages that illustrate and explain changes in how the company does business, according to Jack Fine, training manager at Pacific Bell in San Ramon, Calif. Fine says the training network will eventually be available at all Pacific Bell locations.

Acknowledging that the carrier could lessen bandwidth demand by distributing video training tapes to each site on CDROM, Fine says using a central server allows for instant updates of materials and eliminates version control problems.

Moreover, CDROMs have expenses too: mastering, production, distribution and, of course, the cost of the drives at each location.

Fine also emphasizes the importance of a well-designed training program application.

"We don't feel full-motion video is a requirement for effective interactive multimedia," he says. "One of the things we are aware of is you can get lost in video if you're not careful. People view it like TV, and people are passive watchers of TV."

Delivering info

Other Bell companies are focusing multimedia efforts on delivering new information services to business and home users. Nynex Corp., for example, is partnering with Dow Jones & Co., Inc. to deliver financial information to brokers in New York.

"We will transmit multimedia objects, including video, audio, text and graphics, over T-1 lines to the telephone company office, where it will be stored centrally on a database," says John Connor, Dow Jones' director of television development. "It will then be transmitted to customers over T-1 lines."

Dow Jones will install Starlight Networks, Inc. servers at customer sites. "We hope to have about six sites up for field tests this summer," Connor says. But, he admits, "getting this kind of multimedia product into an office environment is going to be reasonably expensive." Pricing for the service has not been set.

On the Internet, hundreds of massive audio, video and image files are being exchanged daily. An Internet standard called the Multipurpose Internet Mail Extension (MIME) promises to make multimedia over the Internet easier.

MIME lets users send electronic mail with audio and video attachments over Transmission Control Protocol/Internet Protocol networks using the Simple Mail Transfer Protocol. A few MIME-based products for end users, such as Frontier Technologies Corp.'s Super-TCP for Windows, are on the market now.

— Jeff Ubois

Perspective on the Internet

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desktop video, multimedia and high-speed computer-to-computer links.

Soon, T-1 and higher connections will be needed, which will require the backbone parts of the Internet to run at gigabit-per-second speeds.

Lastly, user interfaces must be addressed. These are in poor condition today, usually with a strong whiff of the line interpreter interface typical of 1970s minicomputers. Decent Macintosh and Windows interfaces are needed.

Fortunately, garage shop entrepreneurs are quickly filling this need, and a rapid commercialization of software products is taking place.

Because the Internet is so cheap to use, it will represent major competition to public electronic mail carriers.

The Internet has a well-established pricing tradition based on a flat fee, independent of usage. For example, a user might pay $2 per hour for a line connecting a corporate headquarters in California to a manufacturing contractor at a city in Korea.

This is around 30 to 300 times cheaper than a dial-up line, depending on throughput. It is also anywhere from 50 to 200 times less expensive than sending messages or files by public E-mail services, which are likely to charge about $1.50 per 10K-byte file transfer.

The Internet also has some real disadvantages. You can forget guaranteed delivery times and nondelivery notification, plus your messages are crude ASCII text and readable only by computer nerds. But things are quickly improving as real people inherit the Internet from its earlier computer whiz kid generation.

Multipurpose Internet Mail Extensions — a proper E-mail protocol — is replacing the Simple Mail Transfer Protcol, and there's strong interest in X.500 directory services.

So what will the result be? The Internet becomes the main interorganization E-mail transfer mechanism. That's good news because it's inexpensive.

In addition, public E-mail carriers will rethink their pricing, and that's also good news because Internet pricing will force them to massively reduce their charges. ◻

Ferris is president of San Francisco-based Ferris Networks, a networking and E-mail research firm.

Letters

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lution so the remote notebook computer user is able to connect directly into an IBM Token-Ring LAN and keep SNA intact.

Our mission is not to provide a "me too" modem box, but rather to provide a real networking solution.

Oliver Song
President and chief executive officer
Galaxy Networks, Inc.
Chatsworth, Calif.

Editor's response: Galaxy Networks was invited to participate in the April 19 Buyer's Guide on high-speed modems. However, the company failed to return completed survey forms before the deadline.

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TI's IEF tool gets wings

continued from page 6

Logic, but financial details were not disclosed.

PeerLogic's Pipes Platform is distributed computing software that supports message-based interprocess communications across a variety of networks and operating systems. Pipes Platform currently supports OS/2, DOS, IBM's AIX and MVS operating systems, Microsoft Corp. Windows, Novell, Inc.'s NetWare and Sun Microsystems, Inc.'s SunOS. It also runs across Novell Internetwork Packet Exchange (IPX), Network Basic I/O System, Transmission Control Protocol/Internet Protocol and IBM's Advanced Peer-to-Peer Communications links.

The product provides developers with a simple application program interface (API) for accessing applications across heterogeneous computing environments. IEF's lower level CASE tool, or code generator, will incorporate the Pipes Platform API to help developers build distributed applications.

The deal highlights a continuing trend among CASE vendors to establish partnerships with other vendors that will bring them more squarely into the client/server camp. For example, Bachman Information Systems, Inc. and LBMS, Inc. last year announced deals with Powersoft Corp. to integrate their CASE tools with Powersoft's PowerBuilder, a popular graphical client/server development tool (*NW*, Oct. 5, 1992, p.1).

"CASE companies are picking up alliances with tool companies to get client/server computing into their products," said John Mann, an analyst at The Yankee Group in Boston.

A bonanza without peer

The deal is a bonanza for PeerLogic, which got one of the largest computer companies in the world to resell Pipes Platform worldwide and deploy it internally for building distributed applications.

"We've been looking for strategic partners who can add value to the technology we provide," said Peter Tait, director of product planning at PeerLogic.

Last fall, PeerLogic also signed a deal with Legent Corp., a large maker of systems management software. Legent is using Pipes Platform technology to handle communications between distributed components of an enterprisewide systems management product it is developing.

Among middleware companies, PeerLogic is not alone in seeking big brothers with which to partner. Systems Strategies, Inc. of New York this year teamed up with IBM to develop message delivery products based on Systems Strategies' ezBridge Transact product and IBM's Message Queueing Interface.

Netlink adds SNMP mgmt. to SDLC line

continued from page 6

to provide a complete view of downstream SDLC lines and cluster controllers. The MIB has been submitted to the Internet Engineering Task Force (IETF) by a group of more than 10 net management platform and SNA product vendors as the basis of a standard SNA MIB (*NW*, Nov. 2, 1992, p.1).

The group obtained IETF working group status and defined the MIB at last month's IETF meeting.

The agent will also work with traditional SNMP MIBs, meaning Netlink's SDLC Link Server will no longer be a black hole in users' SNMP-based net management systems, said Anura Guruge, an independent strategic consultant in New Ipswich, N.H.

Unlike many SNMP agents that support only SNMP's GET command, Netlink's agent will respond to GET, SET and TRAP commands, said Michael Bowman, Netlink's vice president of marketing.

The GET command enables agents to respond to queries from a management station but does not support complex commands for controlling devices.

With the addition of the SET command, a net administrator can issue commands to control, perform repairs, change default values and routing tables, or set filters and performance parameters.

Netlink announced that it has also added an SNA/SDLC Dial-In Network Management Support system that will enable the SDLC Link Server to support remote dial-up SDLC connections to the mainframe. This feature will allow the device to deliver configuration, performance and status information to the host-based NetView for dial-up SDLC lines.

The new SNMP and SNA MIBs and dial-up management system will be available by the end of next month in Netlink's 2.0 software release. There is no cost for the upgrade.

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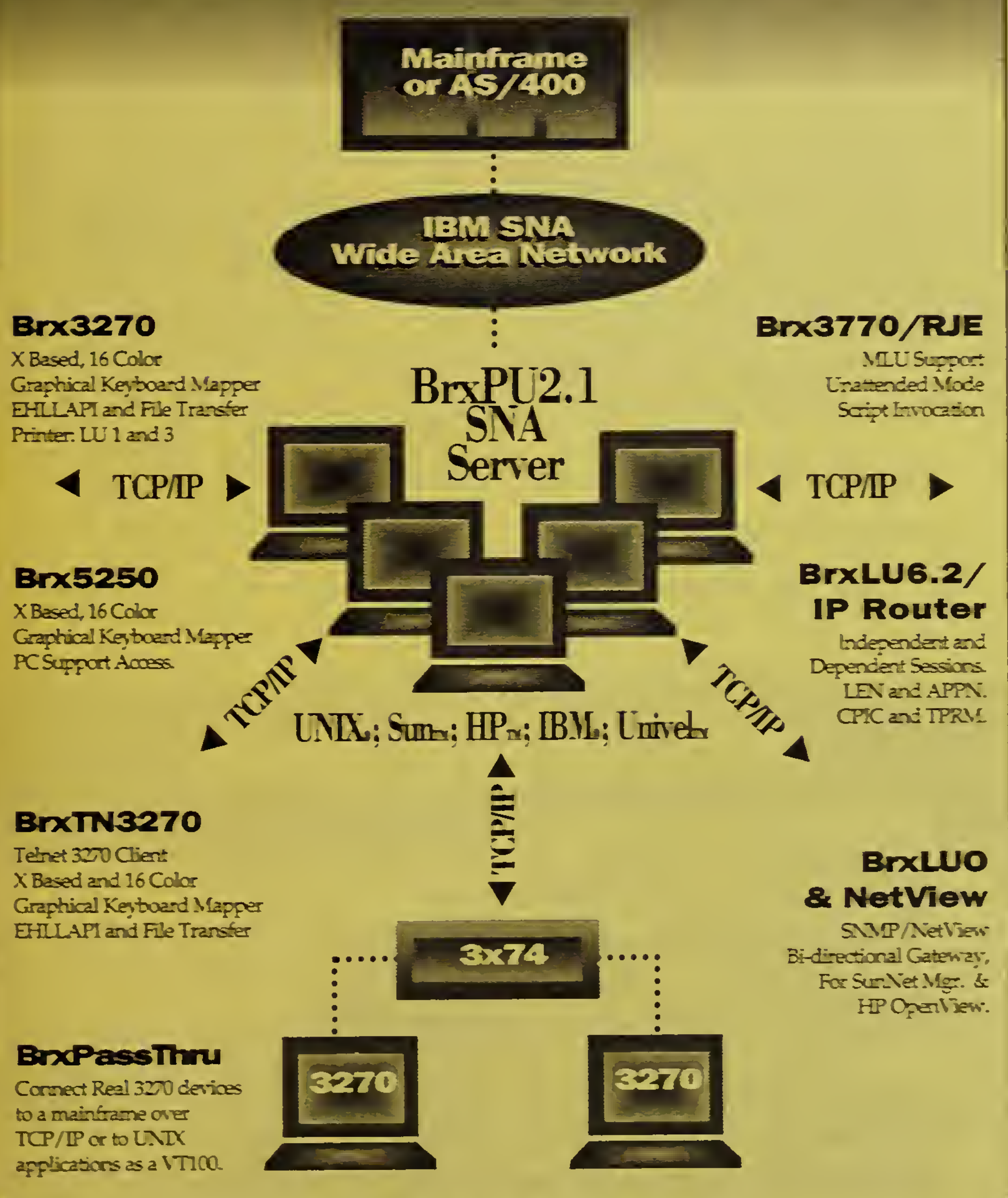

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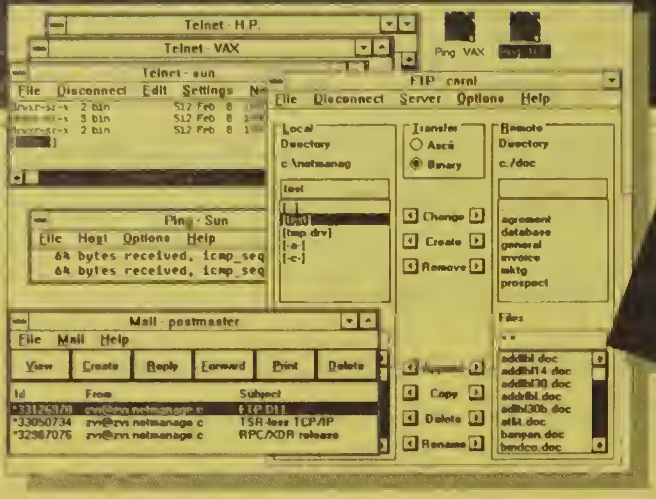

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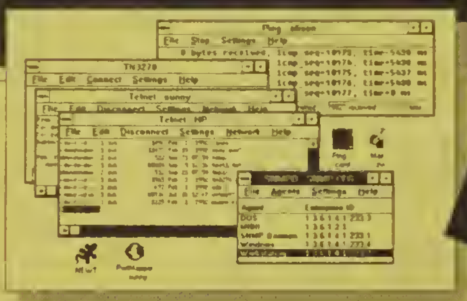

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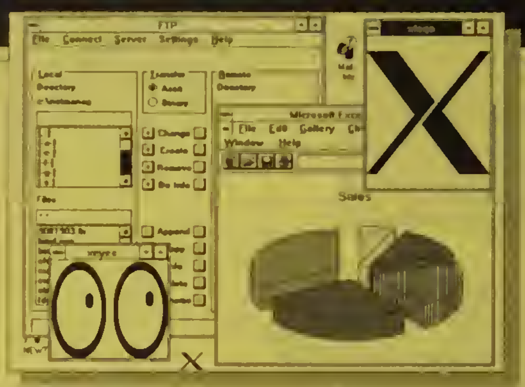

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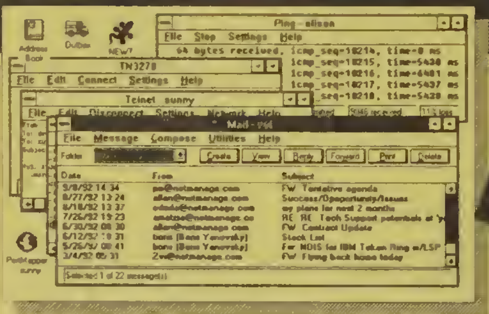

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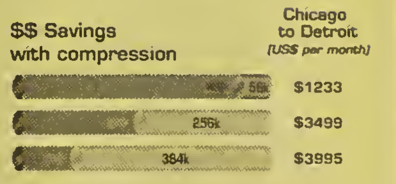

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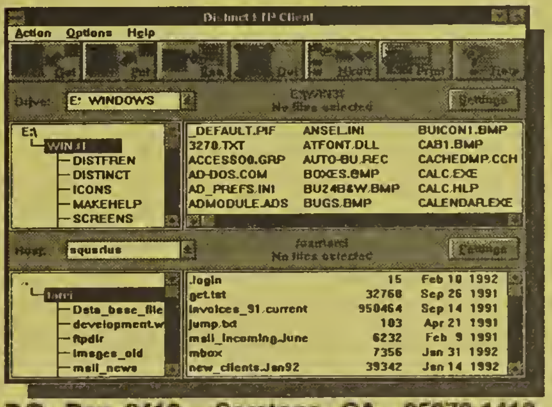

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E: WINDOWS              No files selected
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AD-DOS.COM        BOXES.BMP       CALC.EXE
AD_PREFS.INI      BU24B&W.BMP     CALC.HLP
ADMODULE.ADS      BUGS.BMP        CALENDAR.EXE

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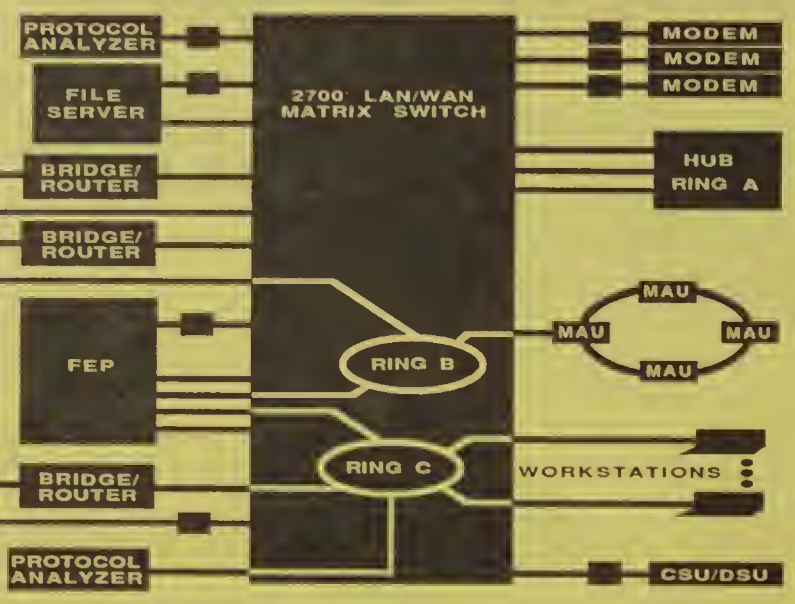

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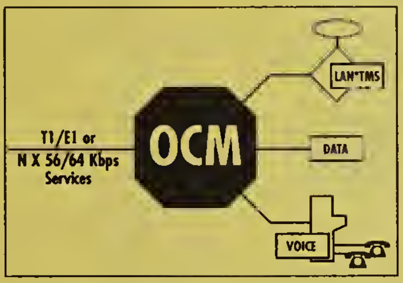

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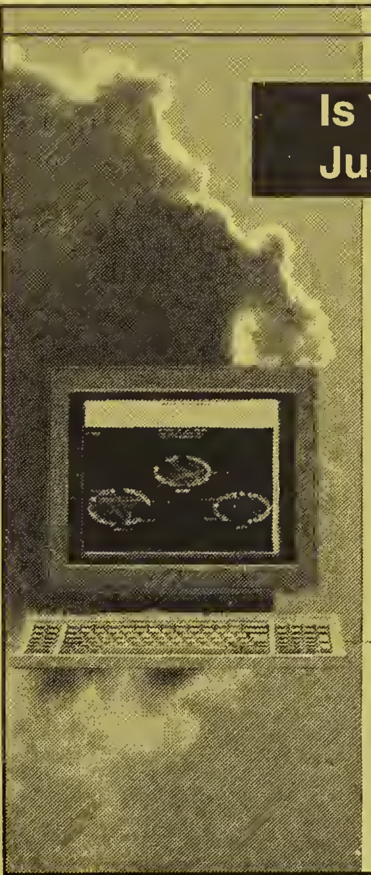

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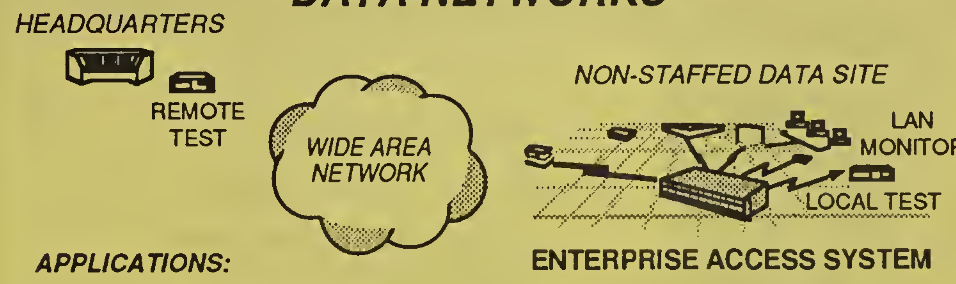

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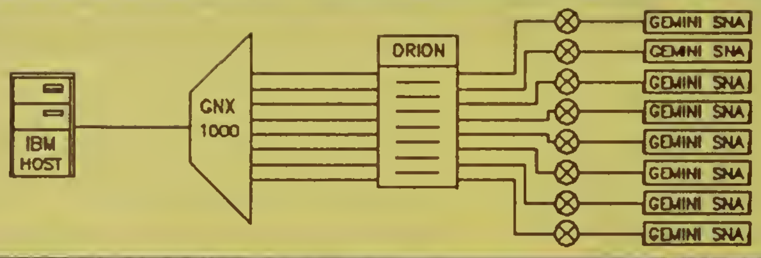

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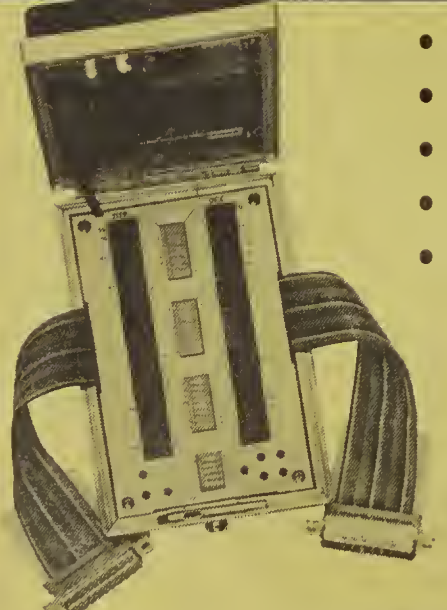

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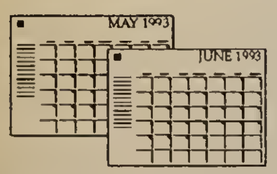

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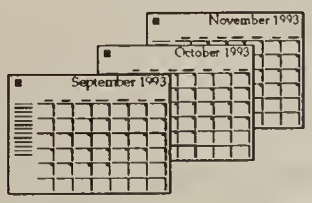

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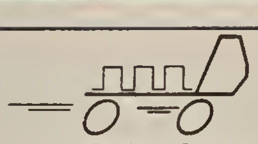

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DOD goes against grain

continued from page 1

DIN), the highly secure yet antiquated network that transports messages electronically but requires them to be printed out and hand-delivered.

The migration of AUTODIN traffic to DMS is expected to take a long time — perhaps 10 years — during which the networks will coexist.

The first phase of the migration will focus on nonclassified but sensitive military traffic, said to account for about 80% of all military messaging.

The Defense Department, which plans to release its DMS RFP this summer, wants to find multiple vendors for the DMS X.400 components and is already setting up interoperability testing requirements for DMS X.400 (see story, p.28).

To help industry develop DMS X.400 — whose Message User Agent (MUA) differs from the standard — the Defense Department plans to release DMS X.400/X.500 source code to DMS bidders when the prototype prepared by the Defense Department and Sterling Software, Inc. is ready.

Along with the source code, it will release the nonclassified encryption application called the Preliminary Message Security Protocol (PMSP).

But at the recent DMS Symposium in Arlington, Va., Defense Department officials acknowledged that the source code may not be ready before the RFP is released.

Why this path?

There are several reasons the Defense Department decided DMS should not conform exactly to 1988 X.400, although the underlying transport will be based on OSI.

U.S. Army Maj. Wayne Deloria said the Defense Department decided the security features in the 1988 X.400 standard — which relies on the Message Transfer Agent (MTA) rather than the MUA to handle security functions — did not meet their needs.

In the 1988 X.400 standard, security access control is provided by X.400 MTA-compliant network switches rather than by the MUA agent on user workstations used to create and send messages.

"We can't rely on a telecommunications infrastructure," Deloria emphasized. "We have to place our trust close to the users."

Steve Kent, chief scientist at BBN Communications, which contributed to the DMS design, agreed that the 1988 X.400 security features — which reflected the view of telecommunications carriers — presumed networks everywhere would support MTA security uniformly.

"But you can't control the entire global network," he said.

Another reason the Defense Department decided to veer from the standard was that the network will use a new suite of both classified and nonclassifed encryption algorithms developed by the National Security Agency (NSA).

"One of the problems was that 1988 X.400 in its security features has been designed around [RSA Data Security, Inc.] cryptographic algorithm," Kent pointed out.

Instead, the government has decided to use the NSA's Capstone public-key algorithm in PMSP, which can work over both X.400 and the Transmission Control Protocol/Internet Protocol Simple Mail Transfer Protocol (SMTP) (see story, p.5).

DMS will require complex multifunction gateways (see graphic, page 1) to translate back and forth between DMS-compliant messages, SMTP and the 1984 and 1988 versions of X.400.

During the transition years, the gateways will have to translate AUTODIN messages into DMS format for transport over the Defense Information Systems Network.

The DMS gateway will also have to encrypt and decrypt messages, add encryption to nonencrypted incoming messages, and translate between encryption systems used by U.S. allies, including Canada and the U.K.

Prototypes of the gateway have not yet been proven to work, in spite of Defense Department efforts. "We're still evolving this," said Air Force Lt. Col. Phil Toler, principal DMS architect.

The Air Force, Navy, Army, Pentagon and NSA all have a hand in prototyping the various components of DMS, but the pieces have not yet been put together to ensure that the entire system will work.

When asked at the recent DMS Symposium how the X.400 directory MUA would function with PMSP in a client/server environment, William Arey, engineering team leader at DMS, replied, "We're still looking at the best way to answer this question."

The military promises that bidders on DMS will be looking at at one large RFP — or multiple RFPs for DMS components — that constitutes a workable specification. ☐

NETWORK WORLD

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UB, NetWorth introduce hubs

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Michael Howard, president of Infonetics Research, Inc., a market research firm in San Jose, Calif. "The flexibility of segmentation has ventured out from its modular roots to [the stackable area]."

The device will be the only stackable hub to support Novell, Inc.'s Hub Management Interface (HMI), Hub Services Manager (HSM) and HubCon management utility, so the device can be used and managed in NetWare nets.

The TriSegment simultaneously provides SNMP and HMI information. NetWare users can manage their entire net via NetWare Management System's HSM, and users with mixed environments will be able to gather full SNMP statistics through NetWorth's HubView SNMP-based management software.

Access/Stax, which supports UB's NetDirector network management system, will also support the company's Virtual Network Architecture (VNA) in the future. VNA is UB's technology that uses Ethernet switching to deliver a wide range of features, such as dedicated high-bandwidth links to the desktop and per-port switching.

UB, which has always focused its hub development at the enterprise level, views the stackable hub as a complement to its Access/One intelligent hub line.

"This announcement gives UB a boost because it now has what the other major players have — a stackable offering," Howard said. "UB, however, has gone one better than its rivals with the segmentation capability."

NetWorth will also benefit. "This move is critical for NetWorth because it brings them into the hottest segment of the market and combats some of the bad financial news they've been suffering from lately," said Todd Dagres, vice president of data communications at The Yankee Group, a consultancy in Boston.

NetWorth officials declined to comment on the announcement.

Available next month, the unmanaged TriSegment hub will cost $1,995, while the managed version is tagged at $2,995. Access/Stax will be unavailable until June, with its pricing mirroring that of the TriSegment models.

While UB and NetWorth are essentially marketing the same box, Howard said there will not be a conflict of interest.

"The two companies are selling into different channels and the pricing is the same, so there won't be a conflict," he said. "In fact, to not have something labeled as a NetWorth product in the UB line and vice versa is good because it won't confuse their respective users." ☐

Networth: (214) 929-1700; **UB:** (408) 496-0111.

Apple, Novell plan offense

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known at this point.

Porting the Macintosh to the 486 could be an offshoot of Apple's efforts to bring the Macintosh to the new PowerPC Reduced Instruction Set Computing platform, Hartsook said. "Modifying the operating system so it becomes portable is something that Apple is doing," he said.

PowerPC is the group effort of Apple, IBM and Motorola, Inc. to develop a new mass market PC platform.

"It seems to me it's an interesting exercise, but I'm not sure if it makes [sound] business sense," Hartsook said.

Despite reports that Apple and Novell hope to ship the new software by June, Hartsook warned that "there's a lot of research stuff that goes on at Apple that never sees the light of day." ☐

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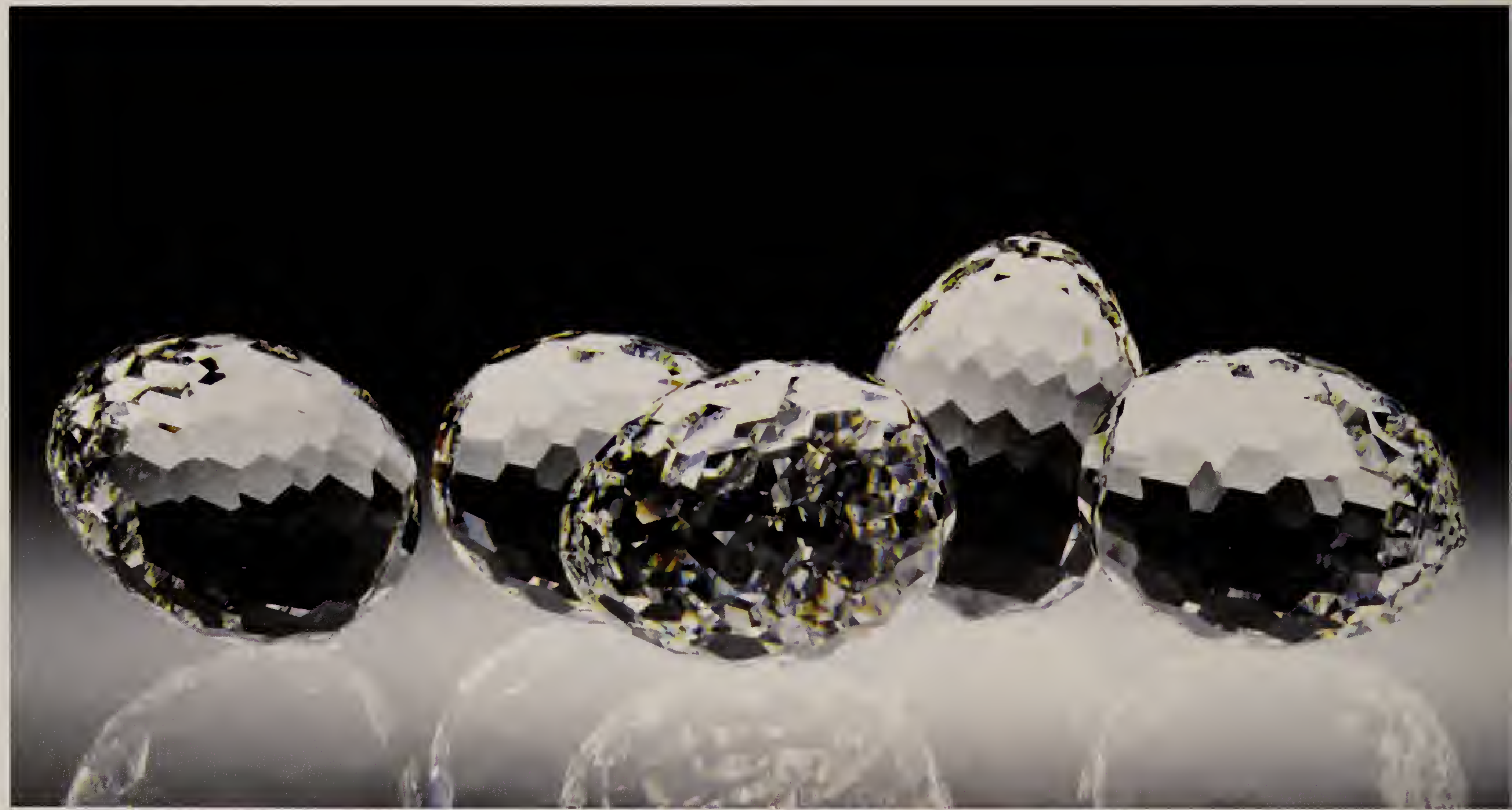

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